Theories and Biological Basis of Addiction

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Preface

Welcome to the online coursebook for our Theories and Biological Basis of Addiction course. The material is designed to be read interactively or after downloading; while the embedded interactive exercises require internet connectivity, each can also be downloaded for offline work. These exercises are presented to help you test and apply what you are reading, challenge yourself, prepare for quizzes, and have a little fun along the way. The list of key terms at the end explains text highlighted in bold italics throughout the book-in the interactive mode you can click on a highlighted word to jump to its explanation in the key terms section. Use the back arrow to return to where you were reading.

Message to Instructors: A number of the chapters in this Open Educational Resource require you to locate and make available links to specified library or online resources. These are identified throughout the coursebook. In the Appendix, you will find a course syllabus template related to the course for which this OER was originally developed. Should you find it necessary to reference this book in your assignments or writing, please do so as follows:

Begun, A.L. (2017). Theories and biological basis of addiction. Published as an online Open Educational Resource (OER).

MODULE 1: INTRODUCTION & OVERVIEW

Theories and Biological Basis of Addiction | 1

Module 1: Introduction

The readings for Module 1 introduce many of the concepts and a bit of background on the theories and biological basis of addiction. This book includes a section developed by the author (chapters 1-3) and a published article.

Module 1 Reading Objectives

After engaging with all of these reading materials and learning resources, you should be able to:

- List the major categories of psychotropic substances which people tend to misuse or become addicted;
- Explain current statistics related to who engages in substance use and misuse, as well as who experiences substance use disorders;
- Recognize several key historical trends and policies addressing substance use and addiction;
- Define key terms related to substance use; and,
- Identify and resolve where stigmatizing language about substance use and addiction occurs.

Ch. 1: Psychoactive Substances

In the first three chapters, you will read about:

- the major types of psychoactive substances;
- key epidemiology trends related to substance use and misuse;
- major historical and current trends in policy and practice related to substance use and substance use disorders; and,
- key terms used in the field of substance use, misuse, and addiction.

Psychoactive Substances

Our course focuses on **psychoactive substances**. Psychoactive substances are chemicals affecting how the brain functions, and thus have the power to affect a person's mind, mood, and behavior when consumed. The word **psychotropic** means the same thing. Many of these substances have important medicinal or other positive purposes when used appropriately. Many also are the subject of concern because of the consequences arising from their misuse and the potential for their use evolving into a substance use disorder.

Types of Substances

One way of organizing the very long list of psychoactive substances is in terms of their actions on the human body. It would be impossible to list every one of these drugs because the list is constantly evolving: not only are new nicknames for drugs being invented all the time, new formulations (drugs) are being developed on a regular basis. In addition, some substances do not fit neatly into a single category. For example, it is difficult to know how to classify caffeinated energy drink plus alcohol beverages (e.g., Four Loko®, Joose®, Sparks+®, Jaegerbombs, or vodka with Red Bull®) since their components fall into two very different categories: caffeine and some other ingredients are stimulants; alcohol is a depressant. (Note that premixed beverages of this type no longer are sold in most of the United States but are still produced for consumption in other nations.)

In many sources, there is a distinction made between legal or illegal "street" drugs. However, this distinction has two major flaws. First, we have seen a tremendous upsurge in the illegal use of legal substances in recent years—by now, you have heard about the problem of prescription drug abuse in the news. Second, laws can change, as we have witnessed recently with states legalizing various uses of marijuana, and laws concerning the legal drinking age that have fluctuated in the United States between 21, 18, 19, and back to 21 just since the 1970s.

The way that clinicians and researchers categorize psychoactive substances is in terms of their effects on the human body or behavior. Tables 1-7 present you with just such a list. Considering some of the substances with which you or people you know may have experience, does it surprise you to see how they are classified? Some people are surprised to see alcohol classified as a depressant, or caffeine and tobacco in the same (stimulant) category as cocaine! The different substances in each category have meaningful psychoactive differences from each other. However, it is important to recognize that they also have some shared common features in terms of how they affect the mind, body, and behavior. We will be looking into each of these different types of substances in the second half of our course. For now, we are aiming for a general overview of the picture concerning "what's what" in the array of psychoactive substances.

Table 1. Stimulants

Examples of Stimulant Drugs	Usual Administration Route & Common Effects
amphetamines (dexadrine, bennies, black beauties, hearts, speed, uppers); attention deficit disorder and narcolepsy medications (e.g., Adderall, Concerta, Ritalin); "bath salts;" caffeine	Administration: Snorted, smoked, injected, swallowed; caffeine also chewed in gum, absorbed through skin in a patch. Effects: Increased heart rate and blood pressure, elevated body temperature, increased body metabolism, reduced appetite, increased energy, feelings of exhilaration and mental alertness, tremors, irritability, anxiety, panic, paranoia, violence and aggression, psychosis. Increased risk of insomnia, weight loss, cardiovascular complications, stroke, seizures, addiction, fatal overdose.
cocaine and "crack" cocaine (blow, C, candy, coke, flake, rock, snow, toot)	Administration: Snorted, smoked, injected. Effects: Nasal damage from snorting, exposure to infectious diseases from injection, poor pregnancy outcomes, and see amphetamines effects above.
methamphetamine (meth, ice, crank, crystal, fire, glass, speed)	Administration: Snorted, smoked, injected, swallowed. Effects: Severe dental problems, poor pregnancy outcomes, explosion/fire risks during production, chemical and environmental contamination from production activities, and see amphetamines effects above.

MDMA (Ecstasy, "club drug" combination of stimulants and hallucinogens of various types)	Administration: Swallowed. Effects: Feelings of euphoria, enhanced mental and emotional clarity, sensations of lightness and floating and other hallucinations, suppression of appetite, thirst, and need for sleep, anxiety, nausea, blurred vision, faintness, high blood pressure, tremors, seizures, elevated body temperature. Increased risk of exhaustion, severe dehydration, sleep disorders, cognitive impairment, confusion, depression, aggression, impulsive behavior, fatal overdose, possible addiction.
tobacco products, nicotine (cigarettes, bidis, cigars, cigarillos, pipe tobacco, e- cigarettes, hookah tobacco, snuff, chew, nicotine patch or nicotine gum)	Administration: Smoked, snorted, chewed; absorbed through skin in a patch. Effects: increased blood pressure and heart rate. Increased risk of chronic lung disease, heart disease, stroke, cancers (mouth, throat, stomach, pancreas, cervix, kidney, bladder, acute myeloid leukemia), poor pregnancy outcomes, overdose (young children), addiction.

Table 2. Depressants and Dissociatives

Examples of Depressant & Dissociative Drugs	Usual Administration Route & Common Effects
alcohol (ethanol, ethyl alcohol, etoh) anti-anxiety medications	
benzodiazepines dextromethorphan (DXM) in large amounts (some cough medicine formulations)	Administration: swallowed; some are smoked, chewed, or injected Effects, low dose: euphoria, mild stimulation, relaxation, lowered inhibition; Effects, high dose: drowsiness, slurred speech, nausea, emotional volatility, poor coordination, impaired perception, impaired memory, sexual dysfunction, loss of consciousness, impaired breathing. Increased risk of injury, depression, neurologic and cognitive deficits, memory loss, high blood pressure, liver and heart disease, poor pregnancy outcomes, addiction, fatal overdose.
pre-anesthesia medications (rohypnol) PCP (phencyclidine; angel dust)	
salvia sleep medications tranquilizers ("tranqs")	

Table 3. Cannabinoids

Examples of	Usual Administration Route & Common
Cannabinoids:	Effects
marijuana (blunt, dope, ganja, grass, herb, joint, "J,"bud, Mary Jane, pot, reefer, smoke, weed); hashish ("hash"); synthetic marijuana compounds	Administration: Smoked, swallowed. Effects: Euphoria, relaxation, slowed reactions, distorted sensory perception, impaired balance and coordination, increased heart rate, increased appetite, impaired learning and memory, anxiety, psychosis. Increased risk of respiratory effects and infections, declining mental health, addiction, unknown effect on pregnancy outcomes. Potential harm from additives.

Table 4.<u>Opiates</u>, <u>Opioids</u>, & Other Pain Relievers (Analgesics)

Examples of opiates, opioids, & other pain relievers	Usual Administration Route & Common Effects
heroin, morphine (and morphine derivatives), opium (laudanum, paregoric, gum, big O, block, black stuff), oxycodone, oxyconton, hydrocodone, percodan/percocet, fentanyl, demerol, darvon/darvocet	Administration: Injected, smoked, swallowed, snorted. Effects: Euphoria, drowsiness and sedation, nausea, impaired coordination, confusion, constipation, slowed breathing. Increased risk of exposure to infectious diseases (hepatitis, HIV), poor pregnancy outcomes, fatal overdose, addiction. Potential harm from inconsistent dosing and additives.
methadone	Administration: Swallowed, injected Effects: Like opioids, used to treat opioid addiction; overdose risk, slowed breathing rate

Table 5. Hallucinogens & Psychotomimetics

Examples of hallucinogenic & psychotomimetic drug	Usual Administration Route & Common Effects
LSD (lysergic acid diethylamide), mescaline (peyote), psilocybin ("magic" mushrooms)	Administration: swallowed, absorbed through oral tissues Effects: altered perceptions and feelings; hallucination, increased heart rate, blood pressure, body temperature, numbness, dizziness, sleeplessness, possibly paranoia/ panic; may develop "flashback" experiences later

Table 6. Steroids

Examples of	Usual Administration Route &
Steroids	Common Effects
anabolic & androgenic steroids (not to be confused with corticosteroids)	Administration: injected, swallowed, absorbed through the skin Effects: hypertension, changes in blood chemistry, liver damage, aggression, acne, infertility and other reproductive system changes

Table 7.<u>Inhalants</u>

Examples of Inhalants	Usual Administration Route & Common Effects
household &	Administration: inhaled
industrial aerosols	Effects: stimulant followed by
(paint thinner,	depression, impaired memory,
gasoline, glue,	nervous system disruption,
butane, refrigerant	muscle weakness, damage to the
gases) nitrous oxide/	cardiovascular and/or respiratory
laughing gas	system, loss of consciousness; risk
("whippets,"	of sudden death

Ch. 2: Who (Mis)Uses These Substances?

If you are wondering just how common substance use and substance use disorders are, you will soon find this to be a more complex question that it might at first appear to be. The answer varies by:

- type of substance
- age group
- gender
- geographic location
- ethnicity, and
- co-occurring problems.

Based on the popular media, you might have the impression that just about everyone is misusing drugs (except maybe you and a few people in your personal network); this just isn't so. The science of epidemiology can help us pinpoint what actually IS going on in terms of trends and patterns related to substance use and misuse, as well as the experience of substance use disorders and other negative consequences.



Before you read on, take a moment to jot down your best guess answers to the following questions:

- What do you think are the 2 or 3 most commonly used substances?
- What percentage of people aged 12 and older do you think use each of those most common substances that you identified?
- What do you predict is the distribution of men versus women using these substances?
- What age group do you predict is the highest user of the substances that you identified?
- What did you predict about the patterns of substance use among people who are white, black,

Hispanic/Latino, and Native American?

• What percentage of the population do you think has a diagnosable substance use disorder?



Epidemiological Studies

Several large-scale epidemiological studies are routinely conducted in the United States that help us develop a picture concerning the prevalence and incidence rates for substance use and substance use disorders. Still other studies provide insight about global patterns. Here are some findings from approximately 57,146 persons aged 12 and over, living in the United States, who responded to the 2015 <u>National</u> **Survey on Drug Use and Health (NSDUH)** reported by the **Substance Abuse and Mental Health Services Administration (SAMHSA**, 2016).

Type of Substance: What is most commonly used substance? Alcohol. Just over half of survey participants indicated that they had used alcohol during the past month (52 percent). This translates to over 138 million Americans considered as "current drinkers." Keep in mind that, although alcohol was the substance most commonly used, only a portion of people who drink alcohol do so in potentially problematic ways (see Figure 1).

Figure 1. Percent reporting past month drinking alcohol, binge drinking, and heavy drinking (derived from SAMHSA, 2016 report for persons aged 12+)



The NSDUH study investigators defined past month *binge drinking* as five or more drinks containing alcohol on the same occasion on at least one day out of the past 30 days. According to NIAAA, drinking in a manner that raises a person's *blood alcohol concentration (BAC)* to 0.08g/dL or higher is binge drinking. By comparison, past month *heavy drinking* was defined in the survey as five or more drinks on the same occasion, on each of five or more days in the past 30 days. The amount and rate of alcohol consumption will be factors in this outcome, along with aspects of individual differences in constitution. In general, for women this means about four drinks in about two hours or five drinks in two hours for men. This pattern sometimes is referred to as risky single occasion drinking (RSOD).

The <u>World Health Organization (WHO</u>, 2014) has identified alcohol as a significant factor in global disease (and death) burden. The <u>harmful use of alcohol</u> is defined as:

drinking that causes detrimental health and social consequences for the drinker, the people around the drinker and society at large, as well as the patterns of drinking that are associated with increased risk for adverse health outcomes (p. 2).

According to the WHO report, the harmful use of alcohol is associated globally with an estimated 3.3 million deaths annually.

In comparison, an estimated 27 million individuals

(about 10.1 percent of the population) aged 12 and over used illicit (illegal) drugs during the surveyed month. The type of illicit drug most often used, by far, was marijuana (see Figure 2). The next most common was the misuse of prescription psychotropic drugs. Less commonly used were cocaine, hallucinogens, heroin, and methamphetamine.

Figure 2. Past month use of various substances (SAMHSA, 2016)



Type of Substance by Age: In the 2015 NSDUH survey (SAMHSA, 2016), patterns of alcohol and illicit drug use can be calculated for each of the following

age groups: 12-17 year olds (youth), 18-25 year olds (emerging adults), 26-64 year olds (adults), and those aged 65 and older. Technically, alcohol is an illicit substance for underage youths (those aged 12-17 in the survey), but for comparison purposes we will include those statistics with the adult drinking statistics. Figure 3 shows the percent reporting past month use of alcohol, binge drinking, and heavy drinking by age group. These numbers all peaked for our emerging adult group. Past month use of illicit drugs was highest among emerging adults (18-25 year olds), and within that adult group, the rate began a steady decline in percentage rate after age 26 (see Figure 4).

Figure 3. Patterns of past month alcohol use by age group.



Figure 4. Patterns of past month illicit drug use by age group.



Type of Substance by Gender: Both alcohol and illicit drug use were more common among adult men than women (see Figure 5). This pattern of gender difference in illicit drug use was not observed among 12 to 17 year olds: the girls reported illicit drug use patterns similar to the boys in this age group (8.8%). The gender differences in illicit drug use first appeared among 18-25 year olds (emerging adults). However,

among 12 to 17 year olds, higher percentages of girls (9.9%) than boys (9.3%) reported using alcohol; men drinkers outnumbered women drinkers among those over the age of 18, and potentially harmful patterns of drinking (binge and heavy drinking) were more commonly reported by men than women in the entire 12+ years sample (see Figure 5).

Figure 5. Drinking and illicit drug use past month patterns by gender for persons aged 12+ years



Of considerable concern are the findings that 9.3 percent of pregnant women reported using alcohol and 4.7 percent reported illicit drug use during pregnancy. This represents an unfortunately high rate of fetal exposure to these potentially damaging substances.

Type of Substance by Race and Ethnicity: The seven U.S. racial/ethnic groups for whom information is reported in the 2015 NSDUH survey include: white; black/African American; Hispanic/Latino; Asian; American Indian/Native Alaskan; Native Hawaiian/ Other Pacific Islander; and, those who report being of two or more races.

The group most likely to report past month use of alcohol was comprised of individuals who identified themselves as white (see Figure 6), and the lowest rates were reported by Asian and Native Hawaiian/Other Pacific Islander groups. Looking at these statistics another way, the highest rates of drinking *abstinence* in the past month appeared among the Native Hawaiian/ Other Pacific Islander and American Indian groups.

The picture is slightly different when looking at the binge-drinking pattern, however. The binge-drinking rate remained highest among individuals who selfidentify as white, with the rate for Hispanic/Latino individuals being almost equal; those who selfidentified as Asian had the lowest binge drinking rates. Heavy drinking, again, was at the highest rate among white individuals; somewhat lower and almost equal were the rates among Hispanic/Latino, black/African American, and American Indian individuals.

Figure 6. Past month drinking patterns reported by race/ethnicity



The group reporting the highest rate of past month illicit drug use was the group who self-identified as belonging to two or more races and the lowest rate was reported among Asian individuals (see Figure 7).

Figure 7. Past month illicit substance use by race/ ethnicity





Now that you have read the information, take a moment to compare what you learned as answers to the questions below with your pre-reading answers:

- What are the 2 or 3 most commonly used substances?
- What percentage of people aged 12 and older use each of those most common substances?
- What is the distribution of men versus women using these substances?• What age group is the highest user of these substances?
- What are the patterns of substance use among white, black, Hispanic/Latino, and Native American persons?
- What percentage of the population has a diagnosable substance use disorder?

Were you surprised by any of the answers? What factors, information, or experiences do you think led you to guess the right or wrong answers?

Ch. 3: A Brief History of Substance Use and U.S. Policy Responses

While many think of substance abuse as а contemporary social problem, the story of humans experiencing problems related to the use of psychoactive substances is at least 4,000-10,000 years old (Hanson, Venturelli, & Fleckenstein, 2015; Howard, Garland, & Whitt, 2013; Singer, 2012). United States history is peppered with documentation of problems associated with alcohol and other drugs. For example, the opiate drug known as morphine, widely used during the Civil War to manage wounded soldiers' pain, left many of them experiencing addiction as a result. Subsequently, heroin also became available and marketed as a "non-addicting opiate with greater analgesic potency than morphine" (Kornetsky, 2007, p. 96)! Prior to the Civil War, 60-75% of Americans who were addicted to opium or morphine were women, in large part because physicians often prescribed opiate drugs to deal with a wide variety of "female" complaints (Blumenthal, 1998). In addition, physicians of the time often prescribed alcohol as a treatment for opiate addiction, and many socially acceptable and widely accessible medicines contained very high alcohol or

opium content (Plant, 1997; Straussner & Attia, 2002; van Wormer & Davis, 2013). See this historic advertisement.



Early U.S. Policy and Legislation Efforts. At around the end of the 19th century, awareness of potential harms associated with these substances spread. For this and other political reasons, the United States Congress was encouraged to enact legislation to control opiate drugs, and passed the Harrison Narcotic Act of 1914. An added public policy motivation: governments could now collect special taxes on the production and distribution of these drugs. Some policies advocated institutionalization in public and criminal facilities, while psychiatric others enforced sterilization as part of the negative eugenics movement (White, 1998). These strategies were viewed as acceptable solutions to the problem of alcohol or other drug addiction as attempts to prevent its spread in the community (Straussner & Attia, 2002).

Since the Harrison Narcotic Act, the United States has implemented other criminalizing policy responses to alcohol and other drug problems. One familiar to most of us was the 18th Amendment–commonly known as Prohibition. This amendment to the United States Constitution banned the manufacture, sale, or transportation of "intoxicating liquors," but not the drinking of alcoholic beverages.

Although the combination of the 18th Amendment to the United States Constitution and the Volstead Act (which clarified that beer and wine were included as alcoholic beverages) were implemented beginning in 1920, many states had already enacted their own more prohibition Venturelli, local laws (Hanson, & http://www.archives.gov/ Fleckenstein, 2015: 21^{st} education/lessons/volstead-act/). The Amendment repealed the federal alcohol prohibition laws in late 1933; some states and local jurisdictions were slower to change their own prohibition policies. Some states continue to have "dry" communities restricting the sale or distribution of alcohol, and some communities maintain "Sunday" or "blue" laws banning the sale of alcohol during certain hours. It was also during the 1920s and 1930s that many states developed prohibition-style policies about marijuana, and the federal government got involved in 1937 with passage

of a Marijuana Tax Act and more severe criminalization policies during the 1950s.

You might find it interesting to pursue historical literature documenting the intersections of alcohol/ drug policy with historical and sociological trends such as the temperance movement, women's suffrage, immigration, organized crime, classism and racism (see for example, Straussner & Attia, 2002; van Wormer & Davis, 2013). Many of these historical policy patterns have implications for today's politics and policy debates, as does the extensive economic impact of both local and international trade in substances such as alcohol, tobacco, coffee, tea, opium, cocaine, and others.

Evolution of Contemporary U.S. Drug Policy. During the 1960s, many programs and policies aimed at addressing both the supply and the demand sides of the drug trade were established. The term "*War on Drugs*" appeared in 1971, referring to stepped-up drug criminalization and law enforcement efforts (McNeece & DiNitto, 2012; Schori & Lawental, 2013). It is important to understand that while these programs focused on our internal drug problem, it is virtually impossible to separate our nation's drug war efforts from international policy, international relations, and global economics. One criticism of "America's Longest War" (the title of a 2013 award winning film) has great relevance to social work and disciplines concerned with social justice issues: the War on Drugs has contributed to extreme racial and gender inequities in the nation's incarceration rates (Bush-Baskette, 1999; Chesney-Lind, 1997). For example, by the early 1990s, 74% of individuals serving prison sentences for drug possession were black, despite their accounting for only 13% of people who used drugs (Kilty & Joseph, 1999). The War on Drugs also may explain the relative explosion of women in prison for non-violent, drug possession charges that occurred during the late 1980s to 1990s–leading to a declaration that the War on Drugs became a "War on Women" (Bloom, Chesney Lind, & Owen, 1994). Another criticism of the War on Drugs addresses its high economic costs: over \$25 billion in fiscal year 2014 alone (ONDCP, 2014).

Pregnant Women and Substance Use. States differ in their policy responses to the use of alcohol or other drugs by women during pregnancy. For example, in some states a pregnant woman can be involuntarily committed to a treatment facility, jail, or relative's home for supervision to prevent her continued use of substances known to be harmful to a developing fetus. Many states have policies relating to the substantiation of child maltreatment allegations when a pregnant mother misuses alcohol or other drugs. While intended to help protect the unborn child from potentially harmful drug exposure, these policies are controversial, as they also may discourage women from seeking much-needed prenatal care for fear of discovery and
becoming subject to consequences imposed through the courts and child welfare system.

Age Legislation. Drinking Drinking age legislation restricts drinking by persons under the age of 21 years to very specific circumstances. You may find it hypocritical that a person who is 18 years old and treated as an adult in all other domains may not be treated as an adult in this particular domain. Drinking establishments are certainly concerned about reduced revenue from not being allowed to legally serve alcohol to 18-20 year olds. On the other hand, there exists compelling evidence that higher drinking age minimums are associated with lower traffic fatality rates, for example. Another rationale involves an attempt to mitigate the potential risks associated with exposing the still-developing, emerging adult's brain to developmental changes alcohol: major in brain structure and function, beginning early in puberty, continue well into the period of adulthood (Spear, 2000). Furthermore, raising the legal age to be well over 18 eliminates confusion about enforcing alcohol-free zones in high schools which is one reason such a policy was supported by school administrators. Drinking age policy periodically becomes contested, tested, and retested in the United States. While this is policy determined at the state level, federal highway funding rules seem to govern the states' uniform decision to support a minimum legal drinking age of 21 years.

Decriminalization Efforts. Our nation has an opportunity to learn from the contemporary "natural experiment" in policy reform whereby several states decriminalized the production, distribution, have possession, and/or use of marijuana. Some hypothesize that *decriminalization* of substance possession or use might reduce the economic incentives for illegal production and distribution of drugs, and allow government entities to increase revenue through taxation (McNeece & DiNitto, 2012). Decriminalization is contested, however, as potentially contributing to increased rates of substance use disorders and other health risks associated with substance use: problems such as driving under the influence. Law enforcement professionals have expressed grave concerns regarding the potential for increased demands on police forces already stretched by the need to manage alcoholrelated situations if marijuana is also legally used by the general public. Recent evidence suggests that the presence of legal (medical) marijuana dispensaries is associated with increased violent and property crime rates in adjacent areas (Freisthler, Ponicki, Gaidus, & Gruenwald, 2016). Addiction treatment providers have expressed concern about the potential impact of easier individuals already in recovery from access on substance use disorders, and the potential for further stressing an under-resourced treatment service system with an increase in demand for intervention to address problems with marijuana use. Prevention experts are concerned about the message that legalization/ decriminalization might convey to young people considering initiating substance use. And, there continues to be controversy as to the potential (as yet, unknown) effects on the health care system resulting from an increase in disease or disability due to longterm use of marijuana products—along the lines of what we see with alcohol.

Drug courts: Traditional drug-control methods of the criminal justice system, such as mandatory incarceration and harsher penalties, along with courtfollowing mandated treatment release from incarceration, have not proven to be sufficiently effective to curb the problems associated with illicit drug use (Broadus, 2009). In addition, these efforts wreak havoc on the court system by creating tremendous backlogs of cases considered to involve relatively minor, non-violent offenses, and push jail populations far over capacity at great public expense. In response, a movement emerged late in the 1980s to establish special courts for managing nonviolent, drugrelated cases. The drug court mission was to engage individuals in court-monitored, structured, evidencesupported treatment and divert them from being incarcerated if they complied with the individuallytailored treatment plan. Each program involves an interdisciplinary team of criminal justice and mental professionals responsible for creating health an individualized comprehensive plan for each program participant, and for monitoring participant progress.

Failure to comply with the plan results in the court levying the traditional sentences for the original offenses.

Harm Reduction Policies. Some strategies and policy approaches are based on the principal that has come to be known as *harm reduction*. While the goal always remains reducing risk by ending high-risk behaviors (like misusing alcohol or other drugs), it is not always wisest to wait for risky behaviors to cease. Instead, it is often wiser to intervene in ways that reduce the potential risks, harms, and other negative consequences associated with the behaviors in the meantime. This harm reduction approach, derived from rather than criminal public health punishment motivations, aims to improve quality of life for individuals, families, and communities associated with the risky behaviors (Collins et al., 2012). Some examples include programs to prevent driving while under the influence of alcohol or other substances, while not necessarily stopping a person from drinking or using substances; clean needle and syringe exchange programs to reduce risk of exposure to blood-borne communicable diseases like HIV/AIDS and hepatitis; supportive housing for which abstinence is not an eligibility requirement. Another reduction harm strategy has recently emerged in many communities: programs for making available to first responders, friends, and family members an emergency pack for administering an opioid overdose reversal drug (naloxone or Narcan®) to save the lives of individuals who might otherwise die of an overdose before professional treatment is accessible. On one hand, harm reduction is viewed as being practical and humane. On the other, there are concerns that harm reduction is too "soft" on people who are breaking the law, that abstinence-only policies are necessary to motivate individuals to change their behavior, and that risk-reduction approaches do not do enough to stop substance use.

Access to Treatment. Improving access to treatment for substance use disorders represents another modern policy/advocacy front with great significance for social work and other human service professions. In Module 2 we will learn about the considerable gap that exists between the need for these services and the numbers of individuals (and families) able to receive them. The nation budgeted just over 10.1 billion dollars to prevention and treatment for fiscal year 2014, including Medicare and Medicaid funded treatment services, substance abuse treatment for veterans and current military service members (and families), and prisoner reentry initiatives (Office of National Drug Control Policy/ONDCP, 2014). Federal funding also currently health-focused centers assists and institutes in monitoring the nation's substance use problems and in studying causal factors and potential solutions. These include the Centers for Disease Control and Prevention (CDC), SAMHSA, and several institutes of the National Institutes of Health (NIH), such as the National Institute on Drug Abuse (NIDA), the National Institute on Alcohol Abuse and Alcoholism (NIAAA), and the National Institute on Mental Health (NIMH).

A person's ability to engage in formal, professional treatment for these problems often depends on an ability to pay with insurance or self-pay dollars. One potential advantage of the Affordable Care Act (ACA) first implemented in the United States during 2013-2014 was the possibility of increased access to mental health and substance use disorder treatment services for many individuals. With passage of the ACA, young people were allowed to remain on a parent's Medicaid plan until the age of 26 years, subsidies helped more people afford health insurance, annual and lifetime benefit limits and limits on number of visits for behavioral health services were eliminate, and behavioral health care became more affordable by ensuring co-pays could not be greater than those for physical health services. The ACA also helped protect insurability for individuals who have a pre-existing condition in their medical records; having a history of a substance use disorder would be a pre-existing condition necessitating protections, no matter how long the person has been in recovery. The federal Mental Health Parity and Addiction Equity Act of 2008 also helped regulate the health plan/insurance industry with regard to benefits for individuals with substance use disorders in their medical histories. Despite excitement over expanded coverage and

protections, concerns arose regarding the treatment system's ability to meet the anticipated increase in demand: Do we have enough trained professionals to meet the experienced need?

At the end of 2016, the U.S. Congress passed two major pieces of legislation related to substance use and addiction. The first was the Comprehensive Addiction and Recovery Act (CARA) that provided legal status for many harm reduction strategies, such as increased access by non-physicians to naloxone for reversing an opioid overdose. However, CARA did not provide funding for these approaches. The second was the 21st Century Cures Act that provided federal funding to "accelerate the discovery, development, and delivery 21st century cures" of and other purposes (https://www.congress.gov/bill/114th-congress/ house-bill/34/text). In addition to ensuring specific

funding for the NIH and Federal Drug Administration, the act provided funding for states with relatively high prevalence of opioid use disorders to develop their responses for addressing the opioid abuse crisis. This included prescription drug monitoring programs, prevention activities, health care provider training about best practices, supporting access to treatment programs, and other public health-related activities to address the identified crisis. The impact of policy revisions regarding health care coverage since the 2017 change in national leadership remains to be seen. The White House created the President's Commission on Combating Drug Addiction and the Opioid Crisis

(March, 2017) with the mission of studying "the scope and effectiveness of the Federal response to drug opioid crisis...and addiction and the make recommendations to the President for improving that response" (https://www.whitehouse.gov/the-pressoffice/2017/03/30/presidential-executive-orderestablishing-presidents-commission). However, at the same time, the Office of National Drug Control Policy (ONDCP), a component of the President's Executive Office, is at risk of being significantly defunded by the year 2018.



Thinking About Policy Issues

For each of the following topics, consider what

evidence supports your position, and what evidence might counter your position.

- Drinking Age Legislation: What do you think about the current minimum legal drinking age policies in the United States? What do you know about policies in your own community regarding being a minor in possession of alcohol, driving while under the influence as a minor, and the provision of alcohol to underage minors? How might these issues apply to cigarettes, ecigarettes, and other tobacco products?
- Drinking or Drug Use during Pregnancy: What do you think should be the state's policy response to women who use alcohol or other substances during pregnancy, and why? What are the social justice issues involved? What are the likely "real world" implications of implementing (or not) such ideas in practice?
- **Prohibiting versus Decriminalizing Policies:** Thinking about the historical policy called Prohibition, what are the parallels and differences with regard to policies restricting distribution and use of other substances like marijuana or opioids/ heroin? Consider the effectiveness or ineffectiveness of public education strategies that

involve "scare tactics" and "Just Say No" policy responses to preventing substance use initiation by young people–what worked and what did not, and for whom were these approaches effective and for whom were they problematic? Why do you think the problems were or were not solved this way?

• Naloxone access policies: Naloxone is not a cure for addiction, but the immediate life-or-death health crisis may be resolved if delivered in time. The wholesale price for a 3-dose administration (necessary for many individuals who use heroin/ fentanyl combinations) can cost over \$4,200. Though the costs to an individual person or family member can be offset to between \$0-\$125 in some communities through donated doses, grants, and public funding, doses provided by first responders may or may not be offset. What do you think about policy allowing non-professionals in the community to obtain prescriptions for naloxone to use if they witness an opioid overdose? What about prescribing it to a person with a diagnosed opioid addiction, to carry for others to administer if needed? How do you feel about doing this for someone yourself (and perhaps conduct rescue

breathing during the time it takes to work)? How do you feel about these costs affecting city/ county/state budgets for first responders?

Ch. 4: Considering the Language That We Use

At this point, you have developed a general "big picture" about the topic of our course: substance use, misuse, and addiction. Throughout Module 1 so far you have read about alcohol and other substance use. You may not have noticed the language used to describe individuals involved with these substances or who experience substance-related problems. For example, you did not read about "substance users," you read about individuals who use substances.

Social workers and members of several other human service professions have long been aware of the importance of the way we use language and the deleterious consequences of applying labels to people. In places where you eventually seek additional information on our course topics you may find that many resources use stigmatizing labels and terms. Not only do labels tend to stereotype, stigmatize, and marginalize people, they also create a pessimistic mindset about the possibility for change. In the field of addictions, awareness about the harms associated with stigmatizing labels like "addict" or "alcoholic" are discussed with increasing frequency. As the field gradually becomes more conscious and aware of this problem in professional writing and speaking, it is important that we all become more conscientious about changing how we discuss the people involved with substances.

Getting us thinking along these lines is the purpose for your second assigned reading, Begun (2016), Considering the Language That We Use: Well Worth the Effort. In this final chapter for Module 1, you will read about the importance of paying attention to the language that we use in discussing and describing people who use substances and people who experience substance use disorders or addiction. You may notice in the reference list a similarly themed article by Broyles et al (2014) that may be of interest to you, as well. After reading the assigned article (click on the link below), remember to return here for the interactive exercises.



Module 1, and proceed to the Coursework area. Under the Readings heading you will find a box with links to the readings for relevant coursebook chapters. Don't forget to return here in your coursebook to complete the remaining chapters and interactive activities.

shed reading this brief article:

- Begin to practice ways of changing the language that you use. For example, start by simply identifying stigmatizing labels used by others when you are reading, listening to radio, television, or movies, and talking about social work issues in your classes or with friends.
- As a next step, think about creative ways of editing what you read or heard to remove the labels and describe people in terms of their experiences instead.
- Think about how this might make a difference in how these individuals are viewed and how they might view themselves as a result.



Here is an exercise for you to practice these new skills. Imagine that you are the instructor for our course. First, read this hypothetical student discussion board posting and identify the 6 places where the use of language is of concern. Just click on your choices (some may be two-word phrases, others are single words) and see how you did.



An interactive or media element has been excluded from this version of the text. You can view it online

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Now, think about how you would suggest rephrasing each of the six problems. Here is one possible solution-many options exist! The point here is to practice the new skills related to the language that we use. Hopefully, you can better edit your own work before posting in our class discussions in the future.

I think that persons experiencing addiction should be able to benefit from treatment for pain, but health care professionals are worried about providing pain medications when there is a question about the actual need. It is kind of the same thing as giving alcohol to someone with an alcohol use disorder to make them feel better. People who misuse substances or have an addiction may believe their pain is worse than they can tolerate, but there may be alternative ways to effectively address pain that doctors and nurses can offer. Treating a person's pain should be done with caution when there is a history of experiencing a substance use disorder, but it should also be done with respect.

Ch. 5: Summary

In the readings for Module 1 you read about:

- Seven major types of psychoactive substances;
- Epidemiological trends in the United States related to substance use and misuse-patterns of use of different types of substances, as well as patterns of use by three different age groups, men versus women, and by racial/ethnic group.
- Major historical and current trends in policy related to substance use and substance use disorders.
- Monitoring the use of language about people who misuse alcohol or other substances.

In addition, this module presented you with opportunities to challenge your thinking about several substance use and misuse topics. You are now well prepared to review the list of key terms introduced in these readings.

Module 1: Key Terms

abstinence: restraining from consuming a particular substance.

- **binge drinking**: In the NSDUH surveys, this is defined as five or more drinks on the same occasion on at least one day. The NIAAA definition is a pattern of drinking alcohol that brings a person's blood alcohol concentration (BAC) to or above the 0.08 gram percent (legal level for driving). Risky single occasion drinking (RSOD) is another term for describing this pattern or drinking. Discussed in greater detail in our course Module 8.
- **blood alcohol concentration**: defined in terms of grams (weight) of alcohol per 100 milliliters of blood, for example 0.08 means 80 milligrams (.08 grams) per 100 milliliters (100 ml=1 deciliter, dL) blood, and can be estimated in breath or urine tests; discussed in greater detail in our course Module 8.
- **cannabinoids**: substances that interact with cannabinoid receptors in the brain to affect neurotransmitter release, such as the compounds in cannabis (marijuana); the subject of our course Module 12.
- **Centers for Disease Control and Prevention (CDC)**: operating through the Department of Health

and Human Services (DHHS) to protect America from health and safety threats, respond to health threats, and support communities in protecting health.

- **decriminalization**: the act of repealing, removing, or reducing legal restrictions or criminal penalties associated with a previously illegal act.
- **depressants**: substances that reduce (depress) one's state of mental arousal, stimulation, or anxiety, as well as slowing the rate of body functions; the subject of our course Module 9, but also includes alcohol (Module 8).
- **dissociatives**: substance that induce a state of relaxation and calm by detaching the conscious mind from perception brain functions, including pain perception—which is why it can be used in medical anesthesia; discussed in our course Module 9.
- hallucinogens (psychotomimetics): substances that induce distortions in the sensory system perceptions of reality (hallucinations); discussed in our course Module 12.
- **harm reduction**: practical strategies for reducing negative consequences from substance use, may or may not involve abstinence.
- **harmful use of alcohol**: the World Health Organization definition involves consuming alcohol in a manner "that causes detrimental health and social consequences for the drinker, the people around the drinker and society at large, as well

as the patterns of drinking that are associated with increased risk for adverse health outcomes" (WHO, p. 2).

- **heavy drinking**: Defined in the NSDUH surveys as a pattern of consuming five or more drinks containing alcohol on the same occasion, on each of five or more days in a month; discussed in greater detail in our course Module 8.
- **inhalants**: chemically volatile substances producing vapors that can be inhaled, and have a psychoactive effect; discussed in our course Module 12.
- National Institute on Alcohol Abuse and Alcoholism (NIAAA): an institute of NIH charged with supporting and conducting research on the impact of alcohol use on human health and wellbeing, and leading the nation's efforts to reduce alcohol-related problems.
- National Institute on Drug Abuse (NIDA): an institute of NIH charged with advancing science concerning the causes and consequences of drug use and addiction, as well as applying that knowledge to improve public health.
- National Institutes of Health (NIH): comprised of 27 institutes and centers, operating through the U.S. Department of Health and Human Services to seek knowledge about the nature and behavior of living systems and application of that knowledge to health enhancement.

National Institute on Mental Health (NIMH): an

institute of NIH leading research into mental disorders, as well as discovery in the science of brain, behavior, and experience toward the goal of prevention and cure of mental disorders.

- National Survey on Drug Use and Health (NSDUH): an annual study sponsored by SAMHSA providing national and state-level data concerning mental health status in the United States, and the use of tobacco, alcohol, illicit drugs, and prescription drug misuse.
- **opiates**: substances containing or derived from opium, reduce pain, and induce sleepiness; the subject of our course Module 11.
- **opioids**: substances the mimic the effects and properties of opiates, but are synthetically derived (not necessarily containing opium); the subject of our course Module 11.
- **psychoactive (psychotropic) substances**: These are substances that, when consumed, have a significant effect a person's mental processes, mind, mood, and behavior.
- Substance Abuse and Mental Health Services Administration (SAMHSA): the federal agency in the Department of Health and Human Services (DHHS) charged with leading public health efforts to advance the nation's behavioral health and reduce the impact of substance abuse and mental disorders on communities.
- steroids (anabolic & androgenic): manufactured substances that mimic the effects of the

naturally occurring hormone testosterone; discussed in our course Module 12.

- **stimulants**: substances that have the effect of increasing alertness, attention, energy, blood pressure, heart rate, and breathing rate; the subject of our course Module 10.
- War on Drugs: the label applied in 1971 by President Nixon to a campaign of United States government policy actions directed toward controlling trade in illegal drugs.
- World Health Organization (WHO): part of the United Nation's system, headquartered in Geneva, and leading global efforts to promote health and responses to global health concerns.

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MODULE 2: INTRODUCING THEORIES OF ADDICTION

Theories and Biological Basis of Addiction | 57

Module 2: Introduction

The readings for Module 2 introduce content related to the definition and diagnosis of substance use disorders and addiction. In addition, you will read about some basic treatment principles and statistics concerning the prevalence/incidence of substance use disorders. This book includes chapters developed by the author (chapters 1-5), and public domain content published by the National Institute on Drug Abuse (NIDA).

Module 2 Reading Objectives

After engaging with these reading materials and learning resources, you should be able to:

- Describe contemporary thinking about the nature of substance use disorders;
- Identify current diagnostic criteria for substance use disorders and other forms of "behavioral" addiction;
- Interpret current statistics related to who in the population experiences substance use disorders and disparities between need for and receipt of treatment;

- Categorize most major theories about substance use disorders;
- Define key terms related to substance use disorders and addiction

Ch. 1: Substance Use & Misuse versus Substance Use Disorders

In the first 4 chapters, we look at substance use disorders from a social work point-of-view. You may be familiar with terms like alcoholism, drug addiction, and alcohol or other drug dependence-these terms all relate to the focus of this introductory reading. You will read about:

- current thinking about the nature of substance use disorders;
- criteria currently applied in the United States for distinguishing between substance use, substance misuse, and substance use disorders;
- key epidemiology trends related specifically to substance use disorders;
- a general framework for classifying theories about the origins and causes of substance use disorders; and,
- key terms used in the field of substance use disorders and addiction.

Substance Use & Misuse versus Substance Use Disorders

There exist many different ways of defining and thinking about <u>substance use disorders (SUDs</u>). <u>Alcohol</u> <u>use disorders (AUDs</u>) represent a special class of SUDs. From a public health perspective, substance use disorders (SUDs) have much in common with other chronic, relapsing diseases like diabetes or high blood pressure. Chronic diseases with a strong behavioral health component may require a lifelong, ongoing commitment to manage and control them. This is in contrast to diseases caused by cancer, bacteria, viruses, or other microbes for which a medical cure exists. Many professionals consider substance use disorders to be naturally progressive in nature. In other words, without treatment, these diseases often get worse over time.

Koob and Simon (2009) characterized addiction in terms of a disorder that escalates from occasional, limited, controlled use of a substance to compulsive use. In addition, their conceptual framework for understanding addiction includes the experience of negative emotional states (anxiety, irritability, and other negative feelings) when unable to access the substance to which a person is addicted. They described three stages in the process of addiction; Figure 1 depicts how these three stages described by Koob and Simon (2009) are interrelated and can become a repeating cycle of addiction over time with increasing levels and persistence of psychological and physical problems.

Figure 1. Diagram depicting the addiction cycle, using DSM-IV criteria (adapted from Koob & Simon, 2009)



This chronic disease perspective is the subject of some debate. For example, there exists plenty of evidence to show that a chronic, relapsing, progressive pattern is true for many individuals, usually those experiencing the most severe forms of addiction. However, this pattern does not hold true for everyone diagnosed with a substance use disorder. Some people can overcome the problem on their own, without formal treatment; many people with milder, earlier-stage substance use disorders do not relapse and their substance-related problems do progress (Cunningham not & 2012). On the other hand, some McCambridge, professionals argue that these individuals may not have been experiencing a true substance use disorder, despite their patterns of serious substance misuse. You can see the complexity of the issues involved. One implication for the high degree of individual variability in the trajectory of substance use disorders is that it seems unwise to rely on a uniform treatment approach for all individuals diagnosed with a substance use disorder

One factor involved in distinguishing between substance use and <u>substance misuse</u> involves looking at the various ways in which a person's use of substances may become problematic use. For example, substance use *may*:

- present a legal problem;
- contribute to other problem behaviors, such as committing crimes to obtain substances, acts of aggression while under the influence, or engaging in risky activities (like driving a vehicle while under the influence or engaging in unsafe sex practices);
- have a negative impact on social relationships with friends, families, or coworkers;
- lead to failure in fulfilling important social roles or responsibilities, including parenting;
- have a negative impact on a person's cognitive

performance (such as perception, thinking, learning, problem solving, memory, and reaction time);

- have a negative impact on a person's physical or mental health; and,
- lead to development of a diagnosable substance use disorder.

It is also important note when an individual's use of substances becomes a problem at the level of family,



workplace, community, or even globally. An individual's decision to use substances has a ripple effect on the rest of the family system. This decision can affect many responsibilities, having family roles and major implications for relationships with all of a person's significant others: parents, brothers and sisters. children, partners, friends, and kin from the extended family. It also has implications for neighborhoods where the substances are distributed and used. For example, the weapons, property threat of crimes, and community violence often accompany the distribution

of illegal substances-supported by illegal drug use. Illegal drug use and trade may fund organized crime, gangs, and terrorist networks in any of a number of countries, not just in the United States-the problem has global ramifications. There also is a significant ripple effect on health, mental health, and criminal justice systems when a person gets into trouble by using substances.

The substances used need not be illegal for there to be significant negative consequences. You can probably think of instances where negative consequences were associated with someone drinking alcohol. For example, someone who has had too much alcohol to drink might be more likely to get into fights, fail to do what was expected at work or at home, or make poor decisions about potentially risky behaviors (such as driving while impaired or engaging in unsafe sex). For some vulnerable individuals, taking substances may induce or make worse existing psychiatric problems, such as a psychotic, bipolar, depressive, anxiety, obsessivecompulsive, sleep, sexual, or neurocognitive disorder. At what point does alcohol or other substance use become problematic? Sometimes, it is when life problems result from substance use. Other times, substance alcohol or other use only becomes problematic when a person develops a substance use disorder. The next chapter outlines the features of substance use disorders, which is where the concept of addiction fits.
Ch. 2: Diagnosing Substance Use Disorders

You might be wondering how definitions of <u>substance</u> <u>use disorders</u> are applied in practice to help diagnose individuals who may have a problem with their substance use. Currently, professionals in the United States heavily rely on the scheme for diagnosing substance use disorders detailed in the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders version 5–called the DSM-5 for short (APA, 2013). Internationally, many countries apply the classification system detailed in the World Health Organization's (WHO) International Statistical Classification of Diseases and Related Health Problems version 10, or the ICD-10 for short (WHO, 2016). The 11th version (ICD-11) is scheduled for publication during 2018.

According to the DSM-5, diagnosis of a substance use disorder depends on a person meeting certain criteria. There are currently 11 criteria assessed when making this type of diagnosis (see Table 1, adapted from APA, 2013). The 11 criteria reflect 4 categories:

- Impaired control over use [items 1-4]
- social impairment/consequences [items 5-7]
- risky use of the substance(s) [items 8-9]

• pharmacological indicators/symptoms: tolerance, withdrawal [items 10-11]

A <u>mild substance use disorder</u> might be the diagnosis if a person experiences two or three of these symptoms.

A <u>moderate substance use disorder</u> would be a more appropriate diagnosis for a person experiencing four or five of these symptoms.

Ultimately, a <u>severe substance use disorder</u> exists when a person presents with six or more of these symptoms.

Substance withdrawal is a separate diagnosis that may or may not accompany the diagnosis of a substance use disorder.

Table 1. Eleven criteria in DSM-5 for diagnosing substance use disorders

1	Often taking alcohol or another substance in larger amounts or for a longer period than intending to
2	A persistent desire or unsuccessful efforts to cut down or control use of alcohol or another substance
3	Spending a great deal of time in activities necessary to obtain, use, or recover from the effects of alcohol or another substance
4	Strong desire, craving, or urge to use alcohol or another substance
5	Failure to fulfill major role obligations at work, school, or home resulting from recurrent use of alcohol or another substance
6	Continued use of alcohol or another substance despite persistent or recurring problems in social or interpersonal relationships that are caused or made worse by the effects of alcohol or another substance
7	Giving up or reducing important social, occupational, or recreational activities because of alcohol or other substance use
8	Recurrent use of alcohol or another substance in situations where it is physically dangerous to do so
9	Continuing to use of alcohol or another substance despite knowledge of having a persistent or recurring physical or psychological problem that could be caused or made worse by its use
10	Developing tolerance for alcohol or another substance
11	Experiencing withdrawal symptoms or taking alcohol or closely related substance in order to relieve or avoid withdrawal symptoms

There are 9 types of substance use disorders identified

in the DSM-5 (see Table 2), each with these general criteria. The type of substance use disorders are related to the type of substance or substances that the person is known to be using.

Table 2. Types of substance use disorders identified in the DSM-5.

DSM-5 Code	Type of Substance
F10	alcohol
F11	opioid
F12	cannabis/marijuana
F13	sedatives, hypnotics, or anxiolytics
F14, F15	stimulants (the 14 code is specific for cocaine, 15 for amphetamines)
F16	hallucinogens (other than cannabis)
F17	tobacco
F18	inhalants
F19	other/unknown substance use disorder

Caffeine is a special case where a substance-related disorder exists, but there is not an actual substance use disorder associated with its use. <u>Polysubstance misuse</u> reflects problematic use of more than one substance type.

Thinking About It:

The focus of our course is on substance misuse and substance use disorders. However, many people argue that the principle of addiction apply to other types of behaviors, as well. For example, you may have heard discussions about what some people call "process" or "behavioral" addictions:

- Gambling addiction
- Internet/gaming addiction
- Sex addiction
- Shopping addiction



Based on what you have learned so far about defining substance use disorders and addiction, consider the following 3 questions:

- What do you think might be the similarities or differences between a person who experiences an alcohol use disorder or addiction to another substance and a person who is "addicted" to gambling?
- Do you believe that a person can be "addicted" to their cell phone or other technology (like internet or online gaming)? Why or why not?
- What do you think about people using the word "addiction" to describe how they feel about a favorite television show? What about advertisers describing their product as "the latest addiction" to promote its popularity?



An interactive or media element has been excluded from this version of the text. You can view it online

here:

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Ch. 3: Epidemiology of Substance Use Disorders

In our Module 1 coursebook you were exposed to statistics reported from the National Survey on Drug Use and Health (NSDUH; SAMHSA, 2016). We are going to return to that survey to examine evidence about the population distribution (epidemiology) of "past year" substance use disorders in the United States. First, we can look at how many people aged 12 years or older met the criteria for a substance use disorder in 2015: about 20.8 million people (7.8% of the population).

Second, we can look at which substances were involved in these disorders. By far, the majority involved alcohol (see Figure 2 and Figure 3), either alone or in combination with other substances.

Figure 2. Number of persons with a past year substance use disorder, by substance type





Figure 3. Number of persons with alcohol, illicit drug, or alcohol plus illicit drug use disorders





A third question that data can help us answer concerns the gap between who needs substance use treatment and who actually is able to receive treatment. According to the NSDUH 2015 survey, 21.7 million persons in the U.S., aged 12 or older, experienced a past year need for substance use treatment. This represents about 8% of the population (or, about 1 in 12 persons). Figure 4 shows how this number was distributed by age group. Figure 4. Numbers in the U.S. in need of substance use treatment



The good news: about 2.35 million individuals received specialized substance use treatment. The sad news: that means about 19.35 million did not, either because they could not (a disparity gap) or because they did not wish to. A significant goal in social work and other professions is to reduce the gap between the need for services and access to services for all members of society. You might be interested to learn more about this "close the gap" issue in terms of health care in general, and alcohol misuse, by visiting the American Academy of Social Work and Social Welfare (AASWSW) website discussing the 12 Grand Challenges for Social Work (http://aaswsw.org/grand-challenges-initiative/ 12-challenges/).

Ch. 4: Classifying Theories

In social work and other professions, our solutions to a social problem are dictated by our theories and assumptions about the problem's root causes. Etiology is the science of the causes and natural course of a disease or problem, and etiology addresses the specific factors that shape the course of that disease or problem over time. We are going to examine a number of theories concerning substance use disorders and addiction in this course. This chapter provides an orientation to one way of classifying the theories about which we will be learning (especially in Modules 3 through 7). This presentation is not the only way to organize or categorize these theories, and it may not fit for every possible theory: there are many theories, in part because the problems are so complex, and because so many people have wrestled with these difficult questions for so many decades. But it is a useful way to think about the various theories presented in the literature.

In our scheme for classifying theories, we are going to work with 3 general theory domains that comprise a biopsychosocial framework:

Biological

- Psychological
- Social Context

Discussing these 3 separately is a means of simplifying what we know and how we think about the issues. Critically important is understanding how these types of theories join together and intersect—if we have learned anything over a lifetime of research, it is that no one theory explains all of what we see in the realm of substance use, substance misuse, and substance use disorders/addiction (see Figure 5). Hence, the use of the term **biopsychosocial** which integrates these 3 domains.

Figure 5. Inter-related connected nature of 3 theory domains





As you review the following descriptions, ask yourself this question: "What would I recommend as a solution if this is, indeed, the root of the problem?" You may be very surprised to see how varied your solutions actually are!

Biological: A sizable body of research evidence addresses two types of potential biological influence on the development of substance use disorders: genetics and neuroscience. Important, too, is how substance use affects physical and mental health, as these also relate to the biological domain.

Genetics: First in the group of biological theories

are those addressing genetics. Key points related to genetics and substance use disorders are:

 genetics contribute to both vulnerability and resilience for developing a substance use disorder;



- genetics alone do not establish a person's destiny: genetic makeup interacts with environment and experience to determine whether or not a substance use disorder emerges;
- there is no single, specific "addiction gene" that applies to all of the different types of substances-genetic susceptibility or resilience appears to be relatively specific to each different type of substance.



Neuroscience: The biological realm of addiction theories also includes neuroanatomy, neurophysiology, and neurochemistry. Maps of the brain regions show how the brain's powerful pain, pleasure, reward, learning, and memory systems interact in the process of developing a substance use disorder or addiction. They also help us understand how difficult it can be to recover from addiction. The science of neurochemistry addresses the different and specific ways that alcohol and other drugs affect the brain at the level of neurotransmitters, which in turn influence the human experience and behavior.

We will learn details about these biological topics in greater detail in Module 3 & 4.

Psychological: Over the years a number of theories about addiction have been developed based on psychological principles. These include, but are not limited to:

- Learning theory (operant and classical conditioning)
- Social learning theory (observational learning)



- Expectancies theory (a person's expected outcomes associated with using a substance)
- Information processing (effects of different types of substances on learning, thinking, behaving)
- Psychodynamic & attachment theory (including self-medication theory)

We will explore this psychological domain in greater detail in Module 5.

Social Context: In order to understand the phenomena of substance use, substance misuse, substance use disorders, and addiction, we need to understand the "familial, occupational, economic, social, religious, political, or educational context" (Hunt & Barker, 2001, p. 169). In the social context domain, we will explore the significance of:

- Ease of access to substances in the social and physical environment
- Social norms about substance use



and misuse expressed in the social environment

- The role played by experiencing social oppression, discrimination, and exploitation in developing/ maintaining substance use and substance use disorders
- Impact of policy, programs/services, laws, and law enforcement in substance use and misuse.

We will explore this social context domain in greater detail in Module 6.

Together, these 3 domains interact to shape individuals' vulnerability, resilience, risk, and protection related to the emergence of, maintenance of, and recovery from substance use disorders or addiction. In Module 7 we will reintegrate these 3 domains into a coherent, more unified picture, and we will examine the implications for prevention.

Ch. 5: The Science of Addiction from NIDA

The final reading for Module 2 comes from the 2014 National Institute on Drug Abuse (NIDA) publication called Drugs, Brains, and Behavior: The Science of Addiction. When you link to this material, read the following sections:

Preface (pp. 1-2) Introduction (pp. 3-4) Part I. Drug Abuse and Addiction (pp. 5-10) Part V. Treatment and Recovery (pp. 25-28)

(Don't worry, you will read the rest of this publication in other modules!)



can locate the assigned pdf file(s) for this chapter. You will need to be logged into our Carmen course, select Module 10, and proceed to the Coursework area. Under the Readings heading you will find a box with links to the readings for relevant coursebook chapters. Don't forget to return here in your coursebook to complete the remaining chapters and interactive activities.

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Ch. 6: Summary

In the readings for Module 2 you learned about:

- current thinking concerning the nature of substance use disorders and the "chronic disease" framework;
- how we might distinguish substance use from substance misuse;
- the 11 diagnostic criteria in the DSM 5 used to identify substance use disorders and the categories of SUDs by type of substance;
- key epidemiology trends related specifically to substance use disorders;
- ways to classify theories about substance use disorders; and,
- key terms used in the field of substance use disorders and addiction.

In addition, this module presented you with opportunities to challenge your thinking about several substance use and misuse topics. You are now well prepared to review the list of key terms introduced in these readings.

Module 2: Key Terms

- **alcohol use disorder (AUD)**: diagnosis for a person whose pattern of alcohol use reflects a sufficient number of the diagnostic criteria (using the DSM-5; incorporates criteria for alcohol abuse and alcohol dependence reflected in the older DSM-IV).
- **biopsychosocial**: a framework for explaining human behavior that integrates biological, psychological, and social context elements and their interactions.
- **mild substance use disorder**: diagnosis applied when a person experiences two or three of the 11 SUD symptoms identified in the DSM-5.
- **moderate substance use disorder**: diagnosis applied when a person experiences four or five of the 11 SUD symptoms identified in the DSM-5.
- **polysubstance misuse**: a term that reflects a person's problematic use of more than one type of substance.
- **severe substance use disorder**: diagnosis applied when a person experiences six or more of the 11 SUD symptoms identified in the DSM-5.
- **substance misuse**: use of a substance or substances leading to the person experiencing problems in the social, psychological, physical, and/or legal domain.

- **substance use disorder (SUD)**: diagnosis for a person whose pattern of substance use reflects a sufficient number of the diagnostic criteria (using the DSM-5; diagnoses are specific to the type of substance used).
- **substance withdrawal**: a separate diagnosis that may or may not accompany the diagnosis of a substance use disorder and involves either the presence of a withdrawal syndrome characteristic for the substance that has been withdrawn, or the use of that substance or closely related substances to relieve or avoid withdrawal symptoms.

Module 2: References

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- Substance Abuse and Mental Health Services Administration (SAMHSA). (2016). Results from the 2015 National Survey on Drug Use and Health: Detailed tables. Retrieved from https://www.samhsa.gov/data/sites/default/

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MODULES 3 & 4: BIOLOGICAL MODELS OF ADDICTION

Theories and Biological Basis of Addiction | 91

Modules 3 & 4: Introduction

The reading for Module 3 & 4 introduces concepts essential for understanding biological theories of addiction, as well as how alcohol and other substances affect the brain and other organ systems in the human body. This online coursebook is treated as a double volume because of the complexity of the content–in fact, the biological basis of addiction could be an entire course all on its own. Our Module 3 & 4 online textbook includes content developed by the National Institute on Drug Abuse (NIDA) and a chapter co-authored by this textbook's author.

Module 3 & 4 Reading Objectives

After engaging with these reading materials and learning resources, you should be able to:

- Explain basic principles of neuroscience as they relate to understanding substance use disorders/ addiction (neuroanatomy and neurotransmitters)
- Identify evidence related to the role of genetics in substance use disorders/addiction
- Identify the ways that substance use affects the brain, behavior, and overall health
- Define several key terms related to substance use

disorders.

Ch. 1: Introduction to Biological Models of Addiction

A sizable body of research evidence addresses four domains of potential biological influence on the development of substance use disorders and addiction.

Genetics: Genetic studies paint a picture indicating that genetics are important in both the appearance of and resistance to substance use disorders. Individuals with genetically close relatives (parents or adult siblings) experiencing a substance use disorder involving opioids, cocaine, cannabis or alcohol have up to an eight times higher risk of developing a substance use disorder themselves (Merikangas, et al, 1998). However, genetics alone do not determine a person's destiny: genetic makeup interacts with environment and a person's lifetime of experiences and interactions with their environmental contexts to determine whether a substance use disorder emerges. It is critically important to note that a majority of individuals with a family history of substance use disorders never develop the problem themselves. Just to repeat that fact: most people with substance use

disorders in their family history never develop the problem themselves.

Another fact that has emerged from decades of research is that there is no one specific "addiction gene" that applies to all



different types of substances. Some of the genes involved are very specific to certain substances—what may "pull" for an alcohol use disorder may not "pull" for a problem with cocaine, for example. Some of the genes involved are not specific to substance use disorders per se, but to a class of problems that have substance misuse as an element—for example, depression. The more we learn about the specific combinations of genes that might be involved, exciting new biological tools for treating or even preventing addiction may emerge, including medications and perhaps even immunizations someday! Neurobiology: The biological realm of addiction studies also includes neuroanatomy, neurophysiology, and neurochemistry.

Together, neuroanatomy, neurotransmitters, and neurophysiology



investigators have begun to develop increasingly complex, detailed, functional maps of the various regions of the brain involved with progression from the use of substances to a substance use disorder. These maps show how the brain's powerful pain, pleasure, reward, and memory systems interact in the complex process of developing an addiction. This also helps us understand how difficult it can be to recover from addiction-difficult, but not impossible. Learning about specific the actions of substances the on neurochemistry (neurotransmitters) in our brains also helps us develop strategies for intervening with substance use disorders, including medications and the use of mindfulness meditation and neurofeedback approaches.

Human Development:

Investigators also direct considerable attention to the developmental effects of a person's exposure to



alcohol and other drugs. Many effects of prenatal exposure to alcohol or other drugs do not show up right away at birth; they may not show up until children enter school years later. You may have heard of fetal alcohol syndrome (FAS), which is at the most extreme end of the continuum; many of the neurological effects and birth defects are more subtle, but still have a profound impact on a person's development, learning, social skills, and other important functions. Many of these same effects and issues apply to substances other than alcohol to which a fetus might be exposed during a woman's pregnancy.

In addition, investigators are concerned about the effects of exposure during adolescence and early adulthood. The use of alcohol or other drugs during these years can have profound, lasting effects on the still-developing brain; effects which have significant implications for how people think, behave, and feel, as well as for susceptibility to addiction later in life (see for example Spear, 2002; Squeglia, Jacobus, & Tapert, 2009). All of the evidence suggests that the earlier a person begins using alcohol or other substances, the greater the likelihood of eventually developing a substance use disorder, because of the interaction between exposure and these brain changes at a critical developmental point. Finally, consider the fact that a person's overall health and development may be affected by poor nutrition, physical trauma or injury, or exposure to diseases that often accompany substance misuse.

Biopsychosocial Perspective: Remember that we are only teasing out one piece of the biopsychosocial perspective in this module–only the biological. As we move into future modules, you will see how this piece fits together with the others to create the larger picture of complexity related to substance use, misuse, addiction.

Reflection: Your Family Tree

Draw a diagram of your family tree for at least three or four generations—this could include both your biological and adoptive family. Use a colored highlighter to mark everyone who you know or suspect had a problem with alcohol or other drugs during their lifetime. Is there a pattern to what you see? What are the implications for your own risk? What are the implications for your own resilience? Do you see how genetics are informative but not completely predictive of what happens related to people developing problems with alcohol or other drugs?

Ch. 2: Brain and Behavior

The second reading for Module 3 & 4 comes from the 2014 National Institute on Drug Abuse (NIDA) publication called *Drugs*, *Brains*, *and Behavior*: *The Science of Addiction*—the very publication that you started to read in Module 2. When you link to this material, read the following sections:

Part III (pp. 15-20): Drugs and the Brain Part IV (pp. 21-24): Addiction and Health

(Don't worry, you will read the rest of this publication in other modules!)

In this chapter you will read about:

- three systems in the brain that play a role in substance use disorders/addiction;
- the human brain at the level of neurons;
- how drugs affect these systems to produce their immediate psychotropic effects and long-term brain changes;
- how drugs affect health; and,
- key terms used in the field of substance use disorders and addiction.



<u>Click here for a link to our Carmen course</u> where you can locate the assigned pdf file(s) for this chapter. You will need to be logged into our Carmen course, select Modules 3&4, and proceed to the Coursework area. Under the Readings heading you will find a box with links to the readings for relevant coursebook chapters. Don't forget to return here in your coursebook to complete the remaining chapters and interactive activities.
Ch. 3: Biology of Addiction

This chapter goes into greater detail about some of the topics introduced in the NIDA publication, and some additional content mentioned in our classification system from Module 2. You will be reading a chapter about neurobiology and addiction from Begun and Brown (2014). As further assistance to your learning, this chapter also includes a case example in which many of the concepts are applied.

In this chapter you will read about:

- the role of genetics in substance use disorders/ addiction;
- basic neuroanatomy as it relates to substance use disorders/addiction;
- basic neurophysiology as it relates to substance use disorders/addiction;
- substance use and human development;
- neurobiology and recovery from substance use disorders;
- clinical implications of this information; and,
- key terms used in the field of substance use disorders and addiction.



<u>Click here for a link to our Carmen course</u> where you can locate the assigned pdf file(s) for this chapter. You will need to be logged into our Carmen course, select Modules 3&4, and proceed to the Coursework area. Under the Readings heading you will find a box with links to the readings for relevant coursebook chapters. Don't forget to return here in your coursebook to complete the remaining chapters and interactive activities.

Please answer these short questions to assess your knowledge of the readings.



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Ch. 4: More about Neurotransmitters and How Neurons Communicate

It is helpful to take a closer look at what happens at the level of neurons and their communication with each other through neurotransmitters. This is relevant because the psychotropic effects of the substances we are studying are very often related to the impact these substances have at the level of neurotransmission.

Figure 1 shows the layout of what happens when brain neurons in close physical proximity to each interact or communicate. It makes sense to consider this microscopic level because these are the building blocks of the brain regions that play a role in how substance use can become a substance use disorder. The *neurotransmitters* that you have been reading about are contained in packets called vesicles, located in the terminal area of a neuron's axon-the area that comes into close contact with the neighboring neurons. The space between the neurons is the *synapse*, or*synaptic cleft*. And this space between neurons is where those neurotransmitters are released to work their changes on their neighboring neurons. The "sending" neuron is the presynaptic neuron, while the receiving neuron is the postsynaptic neuron.

Figure 1.



vesicles contain packets of neurotransmitter to be released into synapse with postsynaptic neurons

Several neurotransmitters are known to play a role in the development, maintenance, and recovery from alcohol or other substance use disorders, as well as other forms of addiction. These include:

- <u>anandamide</u>
- dopamine
- endorphins
- epinephrine
- <u>GABA</u>
- <u>glutamate</u>
- <u>norepinephrine</u>
- <u>serotonin</u>

Several things are very important to understand about neurotransmitters and the system of communication in which they are involved:

- Each type of neurotransmitter is concentrated in one or more specific regions of the brain-they are not distributed evenly all over the brain.
- We used to believe that a neuron could only release one type of neurotransmitter. More recent research indicates that in many cases the same neuron can release two and possibly more types depending on the frequency of the stimulation its receives—at one frequency it might release one type of neurotransmitter, at another frequency it might release a different type.
- Most neurotransmitters occur naturally as important chemicals in other parts of the body (including the peripheral nervous system and other organs) where they have other healthrelated functions, not just in the brain (central nervous system).

- Neurotransmitter release is triggered by many natural behaviors, not just by drugs. For example, dopamine release is involved in the natural reward systems associated with food, sex, humor, pairbonding (mates), listening to music, video games. The addictive potential of a psychotropic drug increases when the concentration of dopamine released is higher compared to what is released by natural behaviors (Johnson, 2014).
- Fast uptake of a drug, for example getting it to the brain by injection rather than ingesting it orally, produces a stronger "high" and therefore a greater potential for addiction. This is because more dopamine is released at once, so it is more powerfully rewarding (Volkow et al., 2010).
- Neurotransmitters released by the <u>presynaptic</u> <u>neuron</u> must be received by their specific receptors on a postsynaptic neuron. If the <u>postsynaptic neuron</u> does not have the right receptors, the release of the neurotransmitter into the synapse/synaptic cleft between them has no effect.
- The brain has specific receptors for certain substances (like the cannabinoid or opioid receptors) because there are <u>endogenous</u> forms of these or chemically similar substances. An example are the naturally occurring <u>enkephalins</u> that bind to the body's opioid receptors, similar to how <u>endorphins</u> work.
- <u>**Transporters</u>** return the "spent" neurotransmitter</u>

substances back to the original (presynaptic) neuron to prepare for release again in the future. Transporters serve to clean up and reduce the concentration of the neurotransmitter in the synaptic space/cleft.

- Neurotransmitters tend to be either <u>excitatory</u> or <u>inhibitory</u> in nature, although a few can do both/ either function (an example is dopamine). Excitatory neurotransmitters turn "on" or stimulate a neuron to fire, inhibitory neurotransmitters turn "off" or block a neuronl from firing.
- <u>Agonist</u> substances trigger a receptor to produce a response, because the receptors "recognize" and bind to it. For example, the THC in marijuana (cannabis) is an agonist that activates the cannabinoid receptors.
- <u>Antagonist</u> substances prevent a receptor from producing its response by blocking the binders or otherwise preventing the response. For example, naloxone treats a heroin/opioid overdose by blocking the effects of the drugs on the body's opioid receptors.
- Certain substances, when combined, create a stronger neurotransmitter response than either could alone. This is called *potentiation*.

Neurotransmitters and Withdrawal

At this point, you have developed a basic understanding of how neurotransmitters play a role in substance use, and have come to recognize the names of some of the key players. Let's take a brief look at the other side of the coin: how neurotransmitters play a role in the experience of withdrawal from certain substances and why this might make a difference in keeping a person motivated to maintain a "quit" attempt after developing a substance use disorder. Here, we can draw from content presented in articles published by Koob and Simon (2009) and Trevisan et al (1998). They tell us that:

- A decrease in dopamine or serotonin (as well as something called the opioid peptide) contributes to the experience of *dysphoria*. What is dysphoria? Dysphoria is the experience of a profound sense of unease, unhappiness, and general dissatisfaction, often associated with major depression and anxiety. [Your other readings also talked about the experience of *anhedonia* during recovery/ prolonged withdrawal, as you may recall. The idea is the same: it is a punishing emotional/ psychological experience.]
- A decrease in GABA contributes to the experience of anxiety, even panic attacks, due to the resulting nervous system hyperactivity.
- An increase in norepinephrine contributes to the

experience of stress.

• An increase in glutamate contributes to hyperexcitability.

Why does this matter? Because these negative emotional and psychological states make it difficult to sustain one's motivation to avoid taking drugs and contribute to the pressure a person might feel to relapse back to using again. And, depending on the nature of the substances involved, withdrawal may lead to decreased dopamine, serotonin, or GABA, as well as increased norepinephrine or glutamate. Knowing about these links between neurotransmitter changes during prolonged withdrawal from using a substance has contributed to the development of several medications to help manage these negative experiences; this, in turn, may help a person to sustain a quit attempt over time. (We will learn more about these medications in Module 13 when we study pharmacotherapy strategies.) Another reason why all of this matters: it helps us to understand the biology behind the frequently reported observation that, during withdrawal and early recovery from many types of substances, the risk for suicide is greater than in the general population.

Interactive Exercise:

See if you can complete this picture laying out how neurons in the brain interact and communicate-refer back to Figure 1 above for the answers.



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Ch 5: Summary

In this Module 3 & 4 online coursebook, you learned about some basic principles of neuroscience as they relate to understanding what happens with substance use, substance misuse, substance use disorders and addiction. We explored the world of genetics, and how this can both contribute to and protect from the development of a substance use disorder. We also learned why a person's genetic makeup is not sufficient to predict the outcome because of the key role played by the interaction with environment and experience. You were also introduced to a great deal of information concerning how drugs affect the brain at a neurotransmitter level, as well as at the level of neuroanatomy, and how other body systems might be affected by substance use. Furthermore, you saw how this knowledge relates to drug exposure and use at different periods of development across the lifespan and how it relates to treatment, recovery, and prevention issues.

You are now ready to review some of the key terms related to substance use disorders that were introduced in this book.

Modules 3 & 4: Key Terms

- **agonist**: a drug that stimulates or promotes a receptor's response; an agonist can cause a similar effect to the drug for which it serves as an agonist by replacing the drug in the neurotransmitter response system (being recognized by the binders)
- **anandamide**: neurotransmitter responsible for relaxation and analgesia (pain reduction)
- **anhedonia**: a person's inability to experience feelings of pleasure in situations which are usually found to be enjoyable
- **antagonistic**: a relationship between a drug and its specific receptors in the brain whereby the antagonist drug prevents or blocks the receptor response to another substance
- **dopamine**: neurotransmitter involved in the reward and pleasure centers of the brain with a significant role in the development of substance use disorders involving many different drugs, as well as non-substance addiction; usually inhibitory
- **dysphoria**: the experience of a profound sense of unease, unhappiness, and general dissatisfaction, often associated with major depression and anxiety.

- **endogenous**: occurs naturally, internal to the body (compared to exogenous, introduced from outside the body)
- **endorphins**: inhibitory neurotransmitter with an effect of blocking pain signals, similar to opioids; occurs naturally in the body (endogenous)
- **enkephalins**: occurring naturally in the body (endogenous), bind to the body's opioid receptors and act as a "natural" painkiller
- **epinephrine**: a neurotransmitter that is usually excitatory, involved in the "fight or flight" response

excitatory: stimulating action

- **GABA**: nickname for the inhibitory neurotransmitter gamma-aminobutyric acid that reduces nervous system excitability; alcohol mimics some effects of GABA by binding to GABA receptors and inhibiting neurons from passing signals
- **glutamate**: excitatory neurotransmitter involved in cognition, memory, and learning; its release is suppressed by alcohol, which causes slower brain activity inhibitory: blocking or suppressing action
- **neurotransmitters**: naturally occurring (endogenous) chemical messengers between neurons
- **norepinephrine**: acts as a neurotransmitter playing a role in attention/arousal, emotion, sleep, dreaming, and learning (also called noradrenaline); part of the "fight or flight"

response of the autonomic nervous system for calming after excitation

- **potentiation**: an interaction between two substances that produces a combined effect greater than the sum of the individual responses.
- **presynaptic neuron**: the neuron sending communication to a neighboring neuron by releasing neurotransmitters across the synapse (synaptic cleft) between them
- **postsynaptic neuron**: the neuron receiving communication from a neighboring neuron by accepting the neurotransmitters released into the synapse (synaptic cleft) between them
- serotonin: a neurotransmitter that is usually inhibitory and has an indirect effect by affecting the of to other responses neurons neurotransmitters like dopamine and norepinephrine (keeps them from overreacting); affected by many different drugs, playing a significant role in the brain's reward systems, thus is involved in substance use disorders and addiction
- **synapse/synaptic cleft**: the communication space between two neurons where released neurotransmitters are concentrated until received/retrieved
- **transporters**: responsible for returning neurotransmitter chemical units back to the presynaptic neuron after they have been

released into the synaptic cleft (reloading for next time)

Modules 3 & 4: References

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MODULE 5: PSYCHOLOGICAL THEORIES OF ADDICTION

Theories and Biological Basis of Addiction | 121

Module 5: Introduction

The reading for Module 5 introduces concepts essential for understanding many of the psychological theories of addiction, as well as how neurobiology and psychology intersect. This online textbook includes content prepared by the book's author, as well as several readings from the published literature.

Module 5 Reading Objectives

After engaging with these reading materials and learning resources, you should be able to:

- Explain substance use disorders and addiction from multiple psychological theories;
- Identify the ways that neuropsychology and cognition intersect in explaining substance use disorders and the problem of cravings;
- Recognize how cognitive and learning theories are applied in cognitive behavioral therapy (CBT) approaches;
- Explain the origins of our expectancies about substance use and how expectancies relate to decisions about use, misuse, and not using;

• Define several key terms related to substance use.

Ch. 1: Introduction to Psychological Models of Addiction

Over the years, psychological principles have contributed to the development of many theories about substance use disorders and addiction. <u>Learning</u> <u>theories</u> represent one set of psychological principles that have had a strong influence on our understanding of the causes of addiction, as well as informing some of our intervention strategies. Relevant learning theories include both operant and classical conditioning principles.

The <u>classical conditioning</u> process helps explain why stimuli in the environment or sensations originating from inside the body often trigger a person's <u>craving</u> for a substance. Certain areas of the brain may be triggered just by



seeing the paraphernalia used to administer a drug, inducing an intense craving for the drug. This is no different, really, from Pavlov's dogs learning to associate food with the ringing of a bell through classical conditioning, and drooling over the previously irrelevant sound. The craving trigger stimulus from the environment might involve any of the five senses: hearing, seeing, touching, smelling, or tasting. Or, craving may be triggered by familiar internal states (like anxiety, depression, loneliness) that were previously alleviated by taking drugs.

Operant conditioning is all about rewards and punishments. A person might use a drug for the first time and enjoy the feelings it creates, which is a **positive reinforcement** for



the behavior. Similarly, the person might find that the drug decreases a negative feeling like pain, low mood, or anxiety. This, too, would be reinforcing—what we call *negative reinforcement*. These basic learning theories are taken a step further with an understanding of <u>social</u> *learning theory*. A person does not necessarily have to experience the rewards and punishments themselves; learning also happens by watching others engage in the behavior and seeing what happens to them.



Through observational learning, we learn to imitate both the precise behaviors and general classes of behavior modeled by others in our social environment. In other words, a person might not imitate a parent who uses alcohol for relaxation from stress (the specific or precise behavior) but imitates the general class of behavior being modeled by using marijuana this way.

This concept leads to another set of psychological principles in addiction: drug or alcohol *expectancies*. Expectancies are the set of beliefs individuals develop regarding how using these substances might affect them. A person develops expectancies from many sources: other people, television, movies, music, news, social media, and others, including their own personal prior experiences with the drug.

Even young children have been shown to develop both positive and negative expectancies about the outcomes of drinking alcohol (Donovan, Molina, & Kelly, 2009).

Simply put, alcohol or other drug use is more likely if positive outcomes are expected



than if negative outcomes are expected. Results from the 2016 Monitoring the Future study of middle and high school students are informative here. The students were asked to rate the harmfulness of various substance use behaviors in terms of how much they believed a person risks self-harm (physical or other ways) by using specific substances. Figure 1 shows a portion of the results from the 8th, 10th, and 12th graders. As you can see, the students expected less potential harm with an experimental trial of these substances (once or twice) compared to occasional or regular use. They also distinguished between the potential harm of using different types of substances, especially they viewed alcohol and marijuana as being less harmful than the other substances. This estimate of harmfulness represents an expectancy related to using these substances in the described patterns.

Figure 1. Percent reporting "great risk" if a person...

Substance use pattern	8 th graders	10 th graders	12 th graders
Try one or two drinks of an alcoholic beverage	14.7	13.3	9.5
Take one or two drinks nearly every day	30.7	32.2	21.6
Have five or more drinks once or twice each weekend	53.4	54.5	48.4
Try marijuana once or twice	22.8	16.4	12.9
Smoke marijuana occasionally	36.8	24.4	17.1
Smoke marijuana regularly	57.5	44	31.1
Try heroin once or twice without using a needle	59.2	73.3	66.1
Take heroin occasionally without using a needle	70.3	82.2	74.6
Try inhalants once	32	40.7	_
Take inhalants regularly	52.1	59.7	_
Take LSD once or twice	22.6	34.4	31.7
Take LSD regularly	36.8	55.2	58.2
Try cocaine once or twice	44.3	54.6	52.7
Take cocaine occasionally	62.4	70.9	68.6
Try any narcotic other than heroin (codeine, Vicodin, OxyContin, Percocet, etc.) once or twice	-	-	43.6

Take any narcotic other than heroin occasionally	_	-	55.7
Take any narcotic other than heroin regularly	-	-	72.4

Yet another set of psychological theories address human *information processing*. This area of cognitive psychology explains how substance use can affect the way that a person takes in (perceives) information from the environment, stores the information as a shortterm memory, moves information into long-term memory, and later retrieves information in order to influence behavior.



Research suggests that when a person learns something while under the influence of a drug, it is possible that they will not be able to retrieve what they learned later, when the person is in a sober state-there simply will not be enough retrieval cues available to trigger the recall. This information processing framework not only has tremendous implications for how individuals function when taking psychotropic substances, but also how they often have to re-learn many things once they enter into recovery or quit using after a period of regular use.

Past clinical literature includes discussions about the "addictive personality." This concept presumes the existence of specific personality traits that characterize individuals who develop substance use or addiction disorders. The idea is that people are predisposed to developing addiction based on specific personality traits (in much the same way we might theorize a predisposition based on genetics). While there may be characteristics commonly observed in the some population of individuals with substance use disorders, the evidence does not support there being a universal set of personality traits or a personality type associated with addiction-evidence for the existence of an "addictive personality" type does not really exist (per Szalavitz, 2016 citing an interview with George Koob, director of the National Institute on Alcohol Abuse and Alcoholism). An argument discussed by Szalavitz (2016) is the observation that 18% of persons with an addiction also have "a personality disorder characterized by lying, stealing, lack of conscience, and manipulative antisocial behavior." While this rate of 18% is more than four times the rate seen across the general population, it still means the 82% of people experiencing addiction do not fit that characteristic. This is the case with study after study of personality traits. The population of people

experiencing addiction is tremendously diverse and heterogeneous on all fronts: demographics and personality alike. This also means that pretty much anyone, regardless of personality type, could potentially develop an addiction if the right (or wrong) combination of factors come together.

There are psychodynamic, attachment theory, and self-medication perspectives about addiction to consider, as well. These psychological approaches suggest that a person uses drugs to fill a terrific void in their emotional lives or as a means of quieting voices of inner conflict. A person might be using the drugs to find relief from physical or emotional pain.



These are called<u>self</u>medication theories. In this line of thinking, a person uses substances to avoid or blunt their negative or disturbing feelings, as in the Pink Floyd song lyrics: "I have become comfortably numb." The underlying basis for the pain

that is being medicated is usually attributed to trauma–adverse childhood experiences (ACES), sexual or violence trauma as an adult, or other experiences associated with post-traumatic stress. We do know that trauma experiences and *post-traumatic stress disorder* (*PTSD*) are commonly reported among women and men with substance use disorders (we will learn more about this in Module 14 when we talk about co-occurring

problems). However, it is a gross oversimplification to attribute this association to self-medication efforts. The aftermath of trauma is complex and variable, changes in (1) involving neurological pathways-especially the amygdala that we studied in Module 3, that keeps signally the presence of threat long after the threat is past, (2) changes in biology, and (3) changes in how a person interfaces with the social environment. Furthermore, trauma is often a consequence of substance misuse, not only an antecedent. Regardless, practitioners are now very aware of how important it is to screen and assess for both PTSD and substance use disorders, and to treat both issues together if they co-occur.



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The remaining readings in this module elaborate further about these psychological models and theories.

Ch. 2: More about Psychological Models of Addiction

The next, brief reading for Module 5 provides an overview of five psychological theories related to the **etiology** of substance use disorders and addiction. You will be reading a piece by Cavaiola, A.A. (2009) called Psychological models of addiction from G.L. Fisher & N.A. Roget, (Eds.), *Encyclopedia of substance abuse prevention, treatment, & recovery, volume 2,* (pp. 720-723). Thousand Oaks, CA: Sage.

In this chapter you will read about:

- Psychoanalytic models,
- Psychopathology models,
- Personality models,
- Behavioral models, and
- Opponent process models.



<u>Click here for a link to our Carmen course</u> where you can locate the assigned pdf file(s) for this chapter. You will need to be logged into our Carmen course, select Module 5, and proceed to the Coursework area. Under the Readings heading you will find a box with links to the readings for relevant coursebook chapters. Don't forget to return here in your coursebook to complete the remaining chapters and interactive activities.

After reading, please try this self-check activity.



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Ch. 3: Addiction and Cognition

Our next reading is a more advanced article discussing the intersection between the neurobiology and psychology (cognition) aspects of substance use. This is a research review article by Gould, T.J. (2010) called Addiction and cognition from Addiction Science Clinical Practice, 5(2), 4-16.

The article begins with a brief review of some of the content you learned in Module 2 and in Module 3 & 4 about addiction and the neurobiology involved (p. 4-5). The content new to you, beginning on page 5, discusses cognitive effects of acute drug administration. This content examines evidence related to how starting to use a drug might affect the formation of drug-stimulus associations (learning theory). This information has great relevance to what you are learning about cravings and the power of these learned associations to trigger relapse in a person attempting to quit using substances. The new content continues with a discussion of cognitive deficits associated with <u>chronic drug use</u> (p. 7). The author describes some of the cognitive impairments that come about from using certain types of drugs over a prolonged period (consider the relevance to information processing theory). The author also discusses some of the cognitive effects we might expect to see during abstinence and early recovery from a substance use disorder. Pay attention to the box on page 8 of the article called Learning in the Mind and Brain-the bullet point about how newly learned material becomes established in long term memory relates directly to information processing, too. Next (on p. 9), the author addresses how drugs affect brain development-an extension of some of the content you read about in Module 3 & 4 concerning adolescent prenatal and exposure. Finally, the relationship between drugs of abuse and mental illness is examined (p. 10). This topic we will discuss in more detail in our final course module (Module 14).

In this (information dense) chapter you will read about:

- how the biology of substance use relates to cognition and cognitive processes;
- how learned associations form that might relate to craving triggers;
- some of the cognitive deficits associated with chronic use of certain substances;
- some effects of substance exposure on the developing brain/mind; and,
- how substance use might interface with mental disorders.



Click here for a link to our Carmen course where you can locate the assigned pdf file(s) for this chapter. You will need to be logged into our Carmen course, select Module 5, and proceed to the Coursework area. Under the Readings heading you will find a box with links to the readings for relevant coursebook chapters. Don't forget to return here in your coursebook to complete the remaining chapters and interactive activities.

After reading, please try this self-check activity-there are 4 questions to click on and aswer.



An interactive or media element has been excluded from this version of the text. You can view it online

here:

https://ohiostate.pressbooks.pub/swk3805coursebook/?p=149
Ch. 4: Implications of Cognition and Learning Theories for Intervention

This chapter demonstrates something we discussed back in Module 1: the ways that theory can inform practice. The authors of the piece that you are reading intervention approach with here discuss an а considerable degree of evidence supporting its use in addressing disorders-<u>cognitive</u> substance use behavioral therapy (CBT). CBT is a type of behavioral intervention based on the assumption that substance use is a learned behavior and that learned behaviors are changeable through learning. CBT might help a person anticipate and avoid events that could trigger an overwhelming desire for using drugs again (cravings) and introduces new skills for managing these challenging situations. CBT is a carefully constructed intervention strategy that helps people learn to think differently about their problems and situations, and to arm themselves with new tools and skills for changing how they behave in response to situations that previously might have ended up in drug use (Barry &

Petry, 2009). The assigned reading here is Granillo, M.T., Perron, B.E., Jarman, C., & Gutowski, S.M. (2013). Cognitive behavioral therapy with substance use disorders: Theory, evidence, and practice. In M.G. Vaughn & B.E. Perron, (Eds.), Social work practice in the addictions, pp. 101-110 (out of 110-117). NY: Springer. Feel free to read the entire piece if you like; but **only pages 101-110 are required** reading.

In this chapter you will read about:

- Behavioral theory and the underlying learning principles of classical and operant conditioning;
- Cognitive theory and common cognitive errors/ distortions;
- Social cognitive theory;
- How CBT integrates these theories and works in combination with other intervention strategies.



<u>Click here for a link to our Carmen course</u> where you can locate the assigned pdf file(s) for this chapter. You will need to be logged into our Carmen course, select Module 5, and proceed to the Coursework area. Under the Readings heading you will find a box with links to the readings for relevant coursebook chapters. Don't forget to return here in your coursebook to complete the remaining chapters and interactive activities.



How do the principles and practices in CBT (cognitive behavioral therapy) for a substance use disorder relate to the various psychological theories we have studied in this module? This includes the learning theories, social learning theory, information processing, and the others.

Ch. 5: Expectancies Theory

This reading addresses how what we expect to happen result drinking alcohol or taking drugs as а (expectancies) affects the decisions and choices we make about using, misusing, or not using those substances. While this piece is specifically about college drinking, the principles apply to anyone faced with making choices about using any substance (or, for that matter, engaging in many different types of behaviors). Feel free to read the entire piece, but the required material begins on page 108 of Reich, R.R. & Goldman, M.S. (2012). Drinking in college students and their age peers: The role of anticipatory processes (chapter 5). In H.R. White & D.L. Rabiner, (Eds), College drinking and drug use, (pp. 105-120). NY: Guilford Press.

In this chapter (pp. 108-117) you will read about:

- Risk taking and sensation seeking within a developmental context;
- The role of expectancies and expected outcomes in choices related to drinking; and,
- How expectancies form through social learning and interactions with the social environment.



<u>Click here for a link to our Carmen course</u> where you can locate the assigned pdf file(s) for this chapter. You will need to be logged into our Carmen course, select Module 5, and proceed to the Coursework area. Under the Readings heading you will find a box with links to the readings for relevant coursebook chapters. Don't forget to return here in your coursebook to complete the remaining chapters and interactive activities.

Ch. 6: Summary

In this Module 5 online textbook, you learned about some basic principles of psychology as they relate to understanding what happens with substance use. substance misuse, substance use disorders, and addiction. We explored a number of learning principles (operant and classical conditioning, social learning theory elements), and how they relate to the development, maintenance, and recovery from substance use or addiction disorders. In addition, you were introduced to expectancies theory, as well as psychoanalytic, psychopathology, and personality theories of addiction. We also examined the interface between neurobiology and cognition as it relates to substance use and misuse. You are now ready to review some of the key terms related to the psychological basis of substance use disorders introduced in this book.

Module 5: Key Terms

- **acute drug administration**: refers to a specific administration or dose of a drug (immediate, short-term, one-time)
- **chronic drug use**: refers to repetitive use of a drug over time (longer term, multiple times).
- **classical conditioning**: learning principle related to pairing of stimuli; a previously neutral stimulus (e.g., bell) becomes paired with a naturally potent stimulus (e.g., food) such that it takes on the power to elicit the same response (e.g., Pavolov's dogs salivating for a bell when it has become paired with food).
- **cognitive behavioral therapy (CBT)**: a category of intervention approaches that include elements of both cognitive and behavioral theory designed to change thoughts (cognitions) and behaviors that are harming or causing distress to an individual.
- **craving**: intensely compelling physical and/or emotional desire to experience again the effects of a substance (or other behavior) previously used (experienced);
- **etiology**: the origins and causal factors of phenomena like substance use disorders or addiction.
- **expectancies**: cognitions about the likely consequences or outcomes of a behavior/action; our

expectations about the likely positive or negative results of using alcohol or another substance form out of observational learning and interactions with the social environment, and have strong influences on our decisions to use, misuse, or not use those substances.

- **information processing**: the way that individuals take in, organizes, stores, and retrieves information.
- **learning theories**: describe the mechanism by which new behaviors are acquired, maintained, and extinguished through interaction/experiences with the environment.
- **negative reinforcement**: operant conditioning consequence that increases probability of repeating the behavior through consequence involving the removal of an experience perceived by the individual as unpleasant (negative).
- **observational learning**: a social learning theory concept describing the mechanism by which behavior modelled by an individual becomes imitated, thus learned, by another individual.
- **operant conditioning**: learning process by which consequences of a behavior shape the pattern of future behavior; reinforcement increases probability of future expression, punishment decreases the probability of repeating the behavior in the future.
- **positive reinforcement**: operant conditioning consequence that increases probability of

repeating the behavior through delivery of a consequence experienced by the individual as satisfying, pleasurable (positive).

- **punishment**: operant conditioning consequence that decreases probability of repeating the behavior through delivery of a consequence experienced by the individual as unpleasant or removal of an experience perceived by the individual as satisfying.
- **self-medication theories**: explain a person's use of substances as resulting from an effort or desire to improve mood, affective, emotional state or reduce physical/emotional pain/discomfort.
- **social learning theory**: an elaboration on learning theory that includes a component where individuals can learn (imitate) others' behavior and the consequences of those behaviors without first directly exhibiting the behavior or experiencing the consequences themselves.

Module 5: References

- Barry, D., & Petry, N.M. (2009). Cognitive behavioral treatments for substance use disorders. In P.M. Miller (Ed.), Evidence-based addiction treatment, pp. 159-174. Boston: Academic Press/Elsevier.
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MODULE 6: SOCIAL Context Theories

Theories and Biological Basis of Addiction | 151

Module 6: Introduction

The reading for Module 6 introduces concepts essential for understanding many of the social context/social environment theories of addiction. This online textbook includes content prepared by the book's author, as well as several readings from the published literature.

Module 6 Reading Objectives

After engaging with these reading materials and learning resources, you should be able to:

- Explain how the social context and physical environment influence substance use, misuse, and addiction patterns
- Identify the components of the social ecological model as they relate to substance use
- Describe how social norms influence substance use and misuse behavior
- Identify social structure theories and how they explain substance use and misuse (culture and subculture, labeling theory, deviance, theory, and the impact of "isms")

- Explain additional social context factors and theoretical perspectives, including family, peers, workplace, neighborhoods, behavioral economics/ behavioral choice theory, and stress and coping theory
- Define key terms related to the social context and physical environment factors related to substance use and substance use disorders.

Ch. 1: Social Context and Physical Environment

The first reading for Module 6 presents a general overview of theories concerning the role of social contexts and physical environments in substance use, substance use disorders, and opportunities for prevention or treatment. These are often referred to as sociocultural theories, but that label does not provide sufficient emphasis about the role of environmental factors. Evidence points to many relevant social and environmental factors that play a role, such as:

- Family and family system dynamics
- Peer groups
- School and workplace
- Neighborhood and community
- Policy and enforcement
- National and global forces

In this first chapter you will read about:

- Social systems, the physical environment, and the social ecological model;
- Social norms theory;

- Social structure influences, culture/subculture and deviance theory, the impact of "isms," and labeling theory; and,
- key terms used in relation to the social context of substance use and addiction.

Social Systems Theories

Anthropologists argue that the use of substances can only be properly understood when placed within a social context: the family, social, school, work, economic, political and religious systems (Hunt & Barker, 2001). An obvious physical environment aspect of context that is important to consider has to do with a person's access to alcohol or other drugs. In general, the physical environment produces opportunities and obstacles that shape the behavior of people living or functioning in those spaces and places. For example, a person who grows up in a warm southern climate may not have an opportunity to learn snowboarding. Someone living in a dangerous neighborhood may not build outdoor exercise into his or her regular daily routine. And, the nutritional value of a person's diet is influenced by living in a "food desert" versus in an area where healthful foods are easily accessed and affordable. Specific to our discussion of substance use, we need to consider how difficult or easy it is to gain access to alcohol, tobacco, or other substances in the family home, school, workplace, peer group, or neighborhood.

One set of questions tracked over time in the U.S. national survey of middle and high school students called *Monitoring the Future* concerns how easy or difficult the students believe it is to obtain various substances. As you can see from Table 1, the 12th graders believed they had easier access to all of the substances (cigarettes not reported) than did 8th and 10th graders. We have no way of knowing for certain if access actually increased with age, only that belief in access increased; however, the belief may be based on reality.

substance	8 th graders	10 th graders	12 th graders	
alcohol	52.7	71.1	85.4	
cigarettes	45.6	62.9	_	
marijuana	34.6	64	81	
LSD	6.9	15.2	28	
heroin	8.9	10.6	20	
other narcotics	8.9	16.8	39.3	
cocaine	11.0	14.9	28.6	

Table 1. Percent of students responding "fairly" or "very" easy to obtain substances, 2016*

*Table created from data presented in *Monitoring the Future* report for 2016.

Social Ecological Model. The social ecological model presents a framework with great applicability for understanding human development and behavior within social systems and contexts. To consider how the social ecological model might apply to the problems of substance use, misuse, and addiction, we can start with the central sphere that represents the individual person. This innermost sphere contains what we have studied so far in relation to a person's biological and psychological makeup-the biopsycho components from our earlier course modules. This is what the person brings to any interactions with the social or physical environments in which he or she functions. Next, we look at the many spheres of influence that form that individual's social ecology: the micro, meso, exo, and macro systems with which individuals interact (see Figure 1). These systems influence us, we influence them, and they influence each other, which explains why there are arrows between the system levels in Figure 1.

Figure 1. Diagram representing social ecological model's multiple system levels



<u>Microsystem</u> components include those social systems with which we directly interact on a regular basis: partners, immediate family members, close friends and others in our most personal, intimate sphere of daily living. These people have a powerful effect on behavior through a number of mechanisms, including the way that they influence learning through delivering consequences (reinforcing or



punishing) behaviors that we exhibit, as well as serving as the models for behavior related to social learning theory. They also shape our immediate environments. For example, they may make it easy to access alcohol, tobacco, or other drugs. While the microsystem influences our experiences, we have an influence on the microsystem, as well. Consider how a person's substance use affects behavior, which in turn has an influence on his or her parenting, relating to an intimate partner, or interacting with friends.

The



microsystem influences and is influenced by the <u>mesosystem</u>, as well. The mesosystem components include those elements in the relatively immediate environment with which we routinely interact in ways

that are less intimate than what happens within our microsystem. For some people this includes extended family and peers/friends with whom we are close but not as intimate. It might include the people with whom we work or go to school and it might include neighbors. For some people this might be a religious community. Health care providers might be part of the mesosystem if a person needs health or mental health care related to substance use.

The exosystem is one step removed more in terms of regular direct interactions and impact. This includes social institutions with which we directly engage less frequently. Depending on



the nature of our interactions, social institutions designed to provide services might be in the mesosystem or exosystem for a particular person or family. For example, this might distinguish between the office where someone works (mesosystem) and the company for whom the person works (exosystem). Or, it might distinguish between the person providing recovery treatment (mesosystem) and the agency where treatment is being provided (exosystem). The practices and policies of these social institutions (e.g., zero tolerance policies) influence the individual's experience in the social environment through indirect interactions, often filtered to through us our

intervening systems (mesosystem and microsystem). A significant component of the exosystem involves community policing and law enforcement around substance-related activities. For individuals involved with drug court by virtue of their substance-related activities, the team of intervention professionals might be part of the mesosystem. Social service delivery systems are part of the exosystem for many people.

Finally, we have the

macrosystem to consider. While few of us directly interact on a routine basis with the elements shaping the cultures and societies in which we live, they do have a powerful (though indirect) influence on our experience. Consider, for example, how change in the legal status of certain substances occurs, and how that change influences behavior at the individual level. Popular media provides an interface between what happens at the macrosystem (and exosystem) level and the more intimate levels of our social environments. It helps shape attitudes, values, beliefs, stereotypes, and stigma about substance use that are expressed by our and microsystem members. Social mesosystem workers and other professionals cannot afford to ignore the impact of policy, laws, and law enforcement patterns at the exosystem and macrosystem levels on

the social context of substance use. For example, in many communities there exists a reciprocal relationship between the two problems of heroin use and the abuse of prescription pain medicines: as communities crack down prescription abuse, making the substances more difficult to obtain, problems with heroin seem to explode.

Within this framework, we can look more closely at theories concerning the mechanisms by which these social ecology elements have their impact, and at evidence concerning these different elements.

Social Norms Theory

Social norms are a key aspect of the social processes involved in substance use–both in terms of initiating use for the first time and in terms of misusing and using to excess. For example, most cultures that accept the use of alcohol also have norms related to the boundaries of acceptable use–when, where, by whom, and how much. Social norms also come into play because a person who believes that everyone else using alcohol or another substance, or at least approves of that substance's use, is far more likely to use than a person who believes that it is not common or accepted in their social context. Here is an interesting thought: if our public education messages suggest that way too many people binge drink or drive under the



influence of substances or use **NO SMOKING** marijuana on a regular basis, are we actually providing a social norm supporting these behaviors? Perhaps, instead, we need to tailor our messages differently. For example, consider the way anti-smoking campaigns have helped to reshape the nation's social norms about tobacco use.

Looking at the Monitoring the Future study results again, we can explore middle and high school students' level of disapproval toward people who use substances. As you can see, occasional and regular use of substances gains more disapproval than trying it once or twice, and the level of disapproval for marijuana and alcohol use declines among the older 12th grade students compared to the younger groups of 8th and 10th graders (see Table 2). What is interesting to note is that the 12th graders seem to make a greater distinctions between types of substances than do the younger students: they disapprove more strongly than the younger students about LSD and heroin, and equally strongly about cocaine, but less strongly about alcohol and marijuana.

Table 2. Percent of students disapproving or strongly disapproving of people who...*

substance use pattern	8 th graders	10 th graders	12 th graders
try one or two drinks of an alcoholic beverage	52.6	41.8	28.8
take one or two drinks nearly every day	79.1	78.6	71.8
have five or more drinks once or twice each weekend	84.9	80.8	74.2
try marijuana once or twice	70.1	52.6	43.1
smoke marijuana occasionally	77.5	61.9	50.5
smoke marijuana regularly	82.3	73.5	68.5
try heroin once or twice without using a needle	85.6	90.2	93.8
take heroin occasionally without using a needle	86.7	90.9	94.0
try cocaine once or twice	86.8	87.9	86.6
take cocaine occasionally	89.3	90.8	90.6
take LSD once or twice	55.2	69.5	82.4
take LSD regularly	57.6	74.9	92.4

*Table created from data presented in Monitoring the Future report for 2016.

Social norms about alcohol and other substance use also tend to be tied to ethnic identity. For example, there exist many drinking-related stereotypes about Irish Americans and Americans with Russian roots. These ethnic stereotypes can have a significant effect on a person's decisions about drinking and drinking to excess. On the other hand, cultural prohibitions around drinking to the point of intoxication may be strong in a person's cultural context. This social disapproval of excessive use (misuse) can be a protective factor against substance use becoming a substance use disorder.

Social Structure Influence Theories

A number of theories draw from the science of sociology to explain the phenomena of substance use, misuse, and addiction. These theories "view the structural organization of a society, peer group, or subculture as directly responsible for drug use" (Hanson, Ventruelli, & Fleckenstein, 2015, p. 78).

Culture and subculture. Policy is a form of intervention heavily influenced by theories about the origin of the problems to which it is responding. To a large extent, policy also is influenced by a culture's values and belief systems, such as the philosophy concerning whether the problem of substance use is better addressed through punishment or treatment. Cultural systems are even responsible for defining what

is a drug in the first place. For example, in the majority culture of the United States, hallucinogenic substances like peyote are defined as drugs of abuse. However, according to anthropologists, peyote religion among certain Native American groups defines this substance quite differently (Hill, 2013).

Or, consider the argument that fast food has addictive



potential-is a fast food burger to be considered a drug and the fast food restaurants responsible for causing an addiction like drug trafficking?

Subculture is about groups that form within a larger culture. The values, beliefs, and behaviors attitudes. within the subculture group may complement or contradict those of the larger cultural context. When they are contradictory, deviance theory may come into play. According to deviance theory, a person (or group) elects to engage in behaviors disapproved of by the conventional "majority" culture specifically because of that disapproval. These individuals embrace their deviance identity-the label becomes

an important aspect of identity. Why would someone want to belong to a deviant subculture or group? For many people, it matter of belonging somewhere, is а anywhere, being better than belonging nowhere. Participating in deviant behavior seems a small price to pay for admission to the group. For others it is a means of differentiating self from others-particularly from those who represent the conventional culture. For example, it is one way of making clear to yourself and the world that you are your own person, distinct from who your parents are. Having strong prosocial bonds with members of the conventional culture is a protective force against deviance-the extent to which a person desires approval and wishes to avoid disapproval of the people with whom they have these prosocial bonds helps them make choices that conform to convention (Sussman & Ames, 2008).



Labeling theory suggests that other people's perceptions of us, the labels they apply to us, have a

strong influence on our own self-perceptions (Hanson, Venturelli, & Fleckenstein, 2015). The individual then has the choice of acting in accordance with the labels (e.g., drinking to excess as an "alcoholic") or acting differently so as to shed the label (e.g., quitting drinking or drinking only in moderation). In addition, theory suggests that when individuals have weak bonds to conventional society, there is less motivation to conform conventional to social norms and expectations. Hence, they are more likely to deviate from those norms. They have less "stake in conformity" than others who choose to behave in ways that comply with conventional norms

The impact of "isms." Issues of racism, classism, sexism, and other forms of



"ism" have a powerful impact on individual's experience of the social world, as well as on their physical environments. Thus, oppression, discrimination, and exploitation based on racial, ethnic, social class, gender, gender identity, sexual orientation, religious, disability, or national origin factors are integral to understanding the social context of substance use disorders. These forms of societal abuse fall along a complex continuum from the obvious and overt to the subtle and covert (Edmund & Bland, 2011). Exposure to repeated instances of *microaggression* may contribute to substance use, as well. Ethnic and racial microaggressions are events that leave the person on the receiving end feeling put down or insulted because of race or ethnicity-regardless of the intent by persons delivering the messages (Blume, Lovato, Thyken, & Denny, 2011). In a study of undergraduate college students, these microaggression experiences were associated with higher rates of binge drinking and experiencing more of the negative consequences associated with drinking (Blume, Lovato, Thyken, & Denny, 2011). Similarly, a study of college students demonstrated that the odds of regular marijuana use increased as a function of the number of microaggressions experienced (Pro, Sahker, & Marzell, 2017). And, again, the same relationship was observed in a study of Native American students and use of illicit drugs (Greenfield, 2015). Thus, it is important for social workers and other professionals to consider the heavy toll exacted on individuals who experience incidents of societal abuse, and how substance use may be related to these cumulative trauma experiences. Not only does this include those who experience it first-hand, but also those who witness it (second-hand)



"Isms" play a role in creating and maintaining marked disparities in opportunity and resources between social at the level of neighborhoods, groups schools, communities, workplaces, and populations. These include discrepancies in media portraval, access or barriers to drugs, disparate exposure to advertising and portrayals of drugs, access to media desirable alternatives to drug use, availability and cultural competence of prevention and treatment options, and the consistency with which sanctions for drug-related activities are imposed (e.g., variable implementation of zero tolerance policies or criminal justice system sanctions). Recall from our Module 1 readings how the War on Drugs related to tremendous racial and ethnic disparities in the nation's incarceration rates.

Consider how social justice concerns and disparities function at the neighborhood and community level. For example, consider the difference between empowered and distressed neighborhoods to defend against the intrusion of illegal drug trafficking and the crime, violence, and exploitation that accompany drug trafficking. Also consider how difficult it becomes in many communities to gain access to evidencesupported prevention or treatment services that are accessible in terms of being affordable, close to home, culturally appropriate, and developmentally (age) appropriate.



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What Comes Next?

Now you have been introduced to several theories and models concerning the ways that the physical environment and social contexts might play a role in substance use, misuse, and addiction. Let's turn our attention to specific arenas where the social world has an impact. This would be the microsystem elements of family and peer group influences. But, let's not forget the significance of the larger social systems and social institutions that are involved, as well.

Ch. 2: Social Contexts

This chapter explores additional topics related to the social context of substance use. The reading for this chapter is Moos, R. (2006). Social contexts and substance use. In W.R. Miller & K.M. Carroll, (Eds.), Rethinking substance abuse: What the science shows and what we should do about it, (pp.182-200).

In this chapter you will read about:

- theoretical perspectives called <u>behavioral</u> <u>economics</u>/behavioral choice theory, social learning theory (that we included in Module 5, Psychological Theories), and <u>stress and coping</u> <u>theory</u>.
- family factors in substance use and misuse
- friends and peer groups in substance use and misuse
- work and neighborhoods in substance use and misuse
- a little about prevention (more on this topic in Module 7)


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Ch. 3: Family

This chapter explores topics related to the role that family and other close (microsystem) relationship play in the addiction experience. In this chapter you will read about:

- the family disease model and codependency controversy;
- families as dynamic systems
- the importance of family to individuals experiencing substance use disorders
- family relationships as protection from or contributing to substance use disorders, including Supportive Significant Others (SSOs)
- key terms used in the field of substance use disorders and addiction.

There is no doubt that substance use disorders "run" in families. We explored some of the data in Module 3 & 4 about the genetic models. As we learned then, expression of our genetic vulnerability or resilience to addiction is heavily influenced by environment and experience. The *family system* is a powerful source of environmental influence to consider. Not only do we need to consider how social learning, social norms, and cultural beliefs related to alcohol and other substances operate within families, we also need to consider how family system principles apply. Family systems theory is discussed in some detail in your lecture content. One of the important features that warrants attention here is the principle of homeostasis as it applies to families. Remember, we learned about homeostasis operating at the individual level in our Module 3 & 4 when looking at how the human body, as a system, works to achieve stability and balance. Family systems do the same. They develop rules. tend to norms, patterns of communication and behavior, and roles that serve this homeostatic function. Consider for example, a family "rule" about not discussing or tending to minimize a member's substance use. This behavior might be dysfunctional in terms of getting the individual's problem addressed, but may serve the family function of keeping the peace despite the problem.

You have read in earlier modules about the disease concept of addiction. Here it makes sense to consider the *family disease model* of addiction. This perspective stems from awareness of how one family member's substance-related problems affect other family members—especially in couples relationships and parent-child relationships (McCrady, Epstein, & Sell, 2003). In this model, the family as a whole is viewed as suffering from disease of addiction. This family disease is characterized by family dysfunction in terms of roles, communication, relationships, and other functions. The implication is that treating addiction requires intervention with families, not just individuals.

The family disease model becomes

controversial when defining the disease as codep<u>endency</u>. codependency The is based assumption clinical on а observation that certain traits and characteristics are common within families experiencing a member's addiction. These traits are characterized by family members' behaviors being organized around the one person's dysfunctional addiction-related behaviors, rather than functioning from within themselves. The codependent family members' behaviors viewed are as supporting or enabling the dysfunctional behavior of the person with addiction because they have become dependent on dysfunctional behavior that being maintained. However, many practitioners argue against such a model and against applying the label or diagnosis of codependency. One reason is that many of the behaviors identified as codependent instead can be viewed as reasonable adaptive responses to a family member's addiction. A second reason is that many of the observed behaviors are also seen in healthy families, therefore are not unique to families where a member experiences addiction. Third, the label has become overused and imprecise, and results in a sort of "blaming" or "shaming" of family members for the problems they experience. Finally, while "clinical descriptions of codependency are common, empirical support for the concept is lacking...there are no compelling empirical data to support the full construct of codependency" (McCrady, Epstein, & Sell, 2003, p. 120). Despite this level of controversy, the family disease model continues to underlie the intervention approach taken bv some practitioners and the beliefs of many nonprofessionals in the public.

Another principle to keep in mind when thinking about family (and peers) with regards to the issue of substance use and misuse is about *homophily*. The idea is that human nature leads us to tend to choose partners and to socialize with acquaintances/friends with whom we have things in common–people similar to us. The saying is, "birds of a feather, tend to flock together." The implication for the substance use arena is that people who choose to use certain substances may choose partners and friends, or to spend time in the company of others who also use those substances. Not only does this have the impact of filtering the social norms and social learning mechanisms to which we are exposed, it also increases the likelihood that if one member of a couple has a substance-related problem, the other may, as well. This, in turn, can complicate the treatment process.

What's Next?

The remaining reading in this chapter interfaces with the lecture content where you learn about family systems theory and the role of "Supportive Significant Others" (SSOs) in the process of developing and recovery from substance use disorders. The reading is McCrady, B.S. (2006). Family and other close relationships. In W.R. Miller & K.M. Carroll, (Eds.), Rethinking substance abuse: What the science shows and what we should do about it, (pp. 166-181).



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Theories and Biological Basis of Addiction | 181

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Ch. 4: Applying Content About Family

In preparation for one of our learning activities, we are going to review an article about family and their role in addiction as demonstrated in the television show *Intervention*. The learning activity asks you to watch an episode of the show informed by this article. The article is Kosovski, J.R., & Smith, D.C. (2011). Everybody hurts: Addiction, drama and the family in the reality television show *Intervention*. *Substance Use & Misuse*, 46(7), 852-858.



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Ch. 5: Summary

In this Module 6 online textbook, you learned several basic principles about the social context and physical environment as they relate to understanding what happens with substance use, substance misuse, substance use disorders, and addiction. We explored many ideas related to this complex topic. Not only were you introduced to several theories (social ecological theory, deviance theory, labeling theory, behavioral economics, and stress/coping theory), you also examined some of the systems that are relevant (family, peers, workplace, neighborhood, and cultural systems). And, you were introduced to the controversy surrounding the family disease model and concept of codependency.

This module concludes our separate analysis of the bio, psycho, and social in our biopsychosocial framework. In Module 7 we will be putting them together again into a more unified whole.

You are now ready to review some of the key terms related to substance use disorders that were introduced in this book.

Module 6: Key Terms

- **behavioral economics**: a model of individual decisionmaking based on rationale choices weighing pros and cons, risks and benefits, and rules-ofthumb of their options; the model integrates neuroscience and psychology.
- **codependency**: describes a pattern of dysfunctional behaviors between two individuals, one with a disease/disorder (e.g., addiction) and the other who becomes emotionally and psychologically dependent on the partner's disordered behavior at the expense of his or her own self and needs. Note that this is a controversial concept!
- **deviance theory**: theory explaining behavior that is outside the bounds of or violates conventional norms of society.
- **exosystem**: elements of the social ecology that have an indirect effect on individual development and behavior without the individual's regular, direct interaction; effect is often mediated through more intimate systems.
- **family disease model**: a perspective about addiction as a disease affecting the entire family, not just the individual experiencing addiction. Note: elements of this model are controversial!
- **family system**: the family is viewed in systems dynamic terms where the family is more than a group of

related individuals; it involves the interactions, relationships, and roles that exist across the family, as well as both how individuals affect the system and how the system affects individuals.

- **homophily**: the principle describing a human tendency to engage socially with people similar to ourselves.
- **labeling theory**: sociological principal explaining individuals' deviant behaviors as resulting from having a deviant label applied to them; living up to the label applied to them.
- **microaggression**: insults, dismissal, and degradation of individuals, usually from a group defined by race or ethnicity; while these incidents fall short of physical aggression, they are experienced as a form of violence by the persons targeted.
- **macrosystem**: the broad cultural systems in which individuals live and that influence individual development and behavior.
- **mesosystem**: systems that have direct impact on individual development and behavior through their interaction with the more intimate microsystem within which the individual exists.
- **microsystem**: the most immediate, direct social system with which individuals interact on a regular basis, having a strong direct impact on individual development and behavior.
- **physical environment**: elements of the places and spaces where individuals function on a regular

basis; may offer opportunities or barriers that influence individual development and behavior.

- **social ecological model**: first described by Uri Bronfenbrenner, this model explains the impact of multiple levels of social systems on individual development and behavior; these social systems and institutions interact and include micro, meso, exo, and macro system elements.
- **stake in conformity**: individuals vary in terms of the number and strength of social bonds formed within conventional society; presumably, the greater the cumulative bond strength, the greater the motivation to conform to conventional norms.
- **stress and coping theory**: theory indicating that life demands create stress to which individuals respond based on the skills that they have for responding to the demands (coping); substance use is one possible coping mechanism although it may ultimately compound stress through increased demands.

Module 6: References and Image Credits

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Social ecological image adapted from the Bronfenbrenner diagram is CC by-SA 3.0 (free to share, adapt): Hchokr at English Wikipedia, CC BY-SA 3.0, https://commons.wikimedia.org/w/ index.php?curid=50859630

MODULE 7: PREVENTION, VULNERABILITY, RISK RESILIENCE, AND PROTECTION THEORIES

Module 7: Introduction

The reading for Module 7 introduces concepts essential for understanding how the biological, psychological, and social context theories of addiction that we have studied can be integrated into a framework for thinking about prevention and intervention. This online textbook includes content prepared by the book's author, as well as several readings from the published literature.

Module 7 Reading Objectives

After engaging with these reading materials and learning resources, you should be able to:

- Explain the continuum of care and prevention frameworks
- Identify key risk and resilience factors addressed in developmental prevention approaches
- Identify a set of evidence-informed prevention and treatment intervention strategies
- Explain basic principles in the transtheoretical model (TTM) of behavior change, the stages of

change, and motivational interviewing

• Define several key terms related to intervening around and preventing substance use disorders

Ch. 1: Integrating Our Theories

The first reading for Module 7 serves as a means of integrating our biological, psychological, and social context theories to inform strategies for *prevention*. This information is provided in the SAMHSA Center for the Application of Prevention Technologies Fact Sheet (pp. 1-11). In this first chapter you will read about:

- the relationship between substance misuse and <u>behavioral health</u>
- prevention within the <u>continuum of care</u> for behavioral health promotion
- risk* and protective factors**
- three types of prevention intervention (*universal*, selective, indicated) and distinguishing between individual and population risk
- four key features of risk and protective factors
- how prevention strategies interface with a <u>developmental framework</u>, including specific risk and protective factors at different developmental periods
- key terms used in discussing behavioral health prevention strategies

*note the definition of **risk factors** presented in this

reading combines what your lecture describes as <u>vulnerability</u> and risk factors—your lecture presents a more finely tuned, distinguishing definition.

note the definition of **protective factors presented in this reading combines what your lecture describes as protective and **resilience** factors—your lecture presents a more finely tuned, distinguishing definition.



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Ch. 2: Prevention Strategies

This chapter presents a range of prevention strategies. This reading is McNeece, C. & Madsen, M.D. (2012). Preventing alcohol and drug problems. In C. A. McNeece & D. M. DiNitto, (Eds.), Chemical dependency: A systems approach, (pp. 171-199). Boston: Pearson. In this chapter you will read about:

- The context of prevention in this area
- Public information and education efforts
- Prevention programs for children, adolescents, and college students
- Technologic modification efforts
- Policy efforts
- Family, community, and media strategies
- Addressing spiritual and cultural factors



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Ch. 3: Motivation and Readiness to Change

This chapter introduces important concepts related to motivation and readiness to change. These concepts form the basis for several contemporary approaches with a strong evidence base for their effectiveness in helping people make healthful changes in behaviors, changes such as reducing or stopping their use of substances. This is important in terms of:

- preventing substance use or misuse from becoming a substance use disorder,
- motivating a person to enter into treatment for a substance-related problem, and
- engaging a person in the change process
- relapse prevention.

This content in this chapter stands in sharp contrast to the highly confrontational *Intervention* approach that you learned about in Module 6 which encourages family members and professionals to be directive, delivering advice and information from a position of authority, and even punitive or coercive (Holleran Steiker, 2016).

You are reading Velasquez, M.M., Crouch, C., Stephens, N.S., & DiClemente, C.C. (2016). Group treatment for substance abuse: A stages-of-change therapy manual, second edition, (pp. 9-36). NY: Guilford Press. In this chapter you will read about:

- the <u>transtheoreticalmodel (TTM)</u> and <u>stages of</u> <u>change</u> in how people make behavioral changes
- matching the right processes with change process stages
- <u>motivational interviewing</u>, <u>ambivalence</u>, and <u>resistance</u>
- an overview of treatment strategies
- key terms used in discussing intervening around substance misuse and substance use disorders



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Ch. 4: Summary

In this Module 7 online book, you learned basic principles about how the biological, psychological, and social context theories come together in a framework for prevention and intervention around substance misuse and substance use disorders. We explored the behavioral health prevention and continuum of care frameworks that guide the planning of evidence-informed intervention strategies. What we learned about risk and resilience factors, especially when applied within a developmental framework, applies to maximizing the preventive potential of our interventions. A number of prevention and treatment interventions were introduced that cover a range of biological, psychological, and social context strategies, and that cover the full range of individual to policy level approaches. Finally, we devoted special attention to an integrative model called the transtheoretical model (TTM) of behavior change, the stages of change, and motivational interviewing as a means of applying these principles.

You are now ready to review some of the key terms related to substance use disorders that were introduced in this book.

Module 7: Key Terms

- **ambivalence**: simultaneously experiencing competing motivations both to and not to make behavioral changes; a normative aspect of the change process that interferes with a person's ability to achieve their change goals.
- **behavioral health**: promoting mental health by preventing or intervening in behaviors and processes that interfere or contribute to mental disorders; this includes substance use and misuse processes and addiction as a mental disorder, but also how they factor into other mental disorders.
- **continuum of care**: a system of intervention approaches that comprehensively covers the entire range of need from prevention through recovery, health maintenance, rehabilitation, and relapse prevention.
- **developmental framework**: a perspective about prevention and intervention guided by an understanding of and evidence related to human developmental periods and processes; in its broadest sense, this framework covers preconception through end of life (lifespan).
- **indicated prevention**: prevention efforts delivered to individuals identified as having early signs or

symptoms of the target problem though have not yet met the clinical criteria for that problem. **motivational interviewing (MI)**: a collaborative, clientcentered approach directed around helping individuals identify and resolve ambivalence about making a behavioral change; MI is based on principles of expressing empathy, developing discrepancy, supporting self-efficacy, and rolling with resistance.

- **prevention**: how we planfully intercede to keep something from happening, hindering its emergence.
- **protective factors**: extrinsic factors in the environment that decrease the probability of individuals developing a specific problem, disorder, or disease; note that this term is often used to also include intrinsic resilience factors (as in your reading, but not in your lecture)
- **relapse prevention**: process by which individuals learn to identify and interrupt their own specific triggers, old ways of thinking and behaving, and other factors that might induce cravings and urges to again use alcohol or other substances they have been working to quit using.
- **resilience factors**: intrinsic factors within individuals (biological, psychological, and experience) that decrease the probability of individuals developing a specific problem, disorder, or disease; note that this term is often incorporated into the concept of protective

factors (as in your reading, but not in your lecture).

- **resistance**: a person's opposition or refusal to participate in treatment/treatment activities, often includes a strong element of ambivalence.
- **risk factors**: extrinsic factors in the environment that increase the probability of individuals developing a specific problem, disorder, or disease; note that this term is often used to also include intrinsic vulnerability factors (as in your reading, but not in your lecture).
- **selective prevention**: prevention efforts delivered to a targeted subgroup of a population, that subgroup being identified as having a higher risk or vulnerability than the remainder of the population.
- stages of change: an element of the transtheoretical model behavior change of providing а theoretical framework for understanding the (cycling) processes involved nonlinear in behavioral change, particularly the stageprogression aspect of precontemplation, contemplation, preparation, action, and maintenance; may include relapse and relapse prevention.
- transtheoretical model (TTM) of behavior change: an integrative biopsychosocial model of intentional behavior change that transcends theories underlying various therapies; combines the stages of change, decisional balance, and self-

efficacy components to understand how people change.

- **universal prevention**: prevention efforts delivered to an entire population regardless of differences in risk or vulnerability, for example to everyone in an entire community of individuals.
- vulnerability factors: intrinsic factors within individuals (biological, psychological, and experience) that increase the probability of individuals developing а specific problem, disorder, or disease; note that this term is often incorporated into the concept of risk factors (as in your reading, but not in your lecture)

Module 7: References

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MODULE 8: ALCOHOL

Theories and Biological Basis of Addiction | 211

Module 8: Introduction

The readings for Module 8 introduce concepts essential for understanding the nature of alcohol, alcohol use, alcohol misuse, and alcohol use disorders. In this Module we are turning the corner from an overview of theories to looking at specific types of substances. We begin with alcohol and cover several other categories before the end of our course. This online coursebook includes several readings from published literature that are introduced and placed in context by the coursebook author.

Module 8 Reading Objectives

After engaging with these reading materials and learning resources, you should be able to:

- Recall information concerning alcohol as the most common substance involved in substance use disorders
- Explain the basic pharmacology of alcohol
- Identify short- and long-term effects of acute and

chronic use and misuse of alcohol

- Identify factors and issues related to adolescent use and misuse of alcohol, including the emerging role of social media (Twitter)
- Explain the role of drinking contexts on consequences and behaviors such as the perpetration of sexual aggression
- Define several key terms related to alcohol and alcohol use disorders.

Ch. 1: Setting the Stage

The first reading for Module 8 sets the stage for the topic of alcohol use, alcohol misuse, and alcohol use disorders (often abbreviated as AUDs). You may recall from earlier modules that, of all the substances we are studying, alcohol is the one most commonly used by individuals over the age of 12. You also may recall that individuals who have a diagnosable substance use disorder most commonly have a problem with alcohol: alcohol use disorders (AUDs) are far more common than substance use disorders (SUDs) involving illicit drugs, and individuals experiencing a substance use disorder involving illicit drugs often experience a problem with alcohol, too. You may remember seeing the information presented in Figure 1 below back when you read about the NSDUH (SAMHSA, 2016) study results in our coursebook for Module 2 (see Figure 1).

Figure 1. Number with a past year substance use disorder, by substance type



You may also recall Figure 2 from our Module 2 reading, based on information from the NSDUH study (SAMHSA, 2016). It shows the frequency with which individuals experience substance use disorders involving alcohol only, illicit substances only, or alcohol and illicit substances in combination (see Figure 2).

Figure 2. Number of persons with alcohol, illicit drug, or alcohol plus illicit drug use disorders



For these reasons, alcohol was chosen as the first of the specific substances that we are exploring in our course. The rest of the reading for this first chapter comes from a traditional textbook about chemical dependency. You will be reading two units about alcohol from Doweiko, H.E. (2009). Concepts of chemical dependency, seventh edition, (pp. 60-88). Belmont, CA: Brooks/Cole, Cengage Learning. Despite being an older piece, the concepts remain relevant; statistics about alcohol use, alcohol misuse, and alcohol use disorders discussed in the Doweiko (2009) pieces are updated in your lecture series for Module 8. And, to foreshadow what is coming in Module 10 when we talk about stimulants (and caffeine), there is some information to consider about combining energy drinks with alcohol.

In this chapter you will read about:

- background material concerning alcohol
- the pharmacology of alcohol (some of which was introduced in Module 3 & 4)
- short- and long-term effects of alcohol at different blood alcohol levels, for the average drinker, with acute alcohol misuse, and with chronic, heavy use
- key terms related to alcohol use, alcohol misuse, and alcohol use disorders.



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Ch. 2: Alcohol Initiation Before and During Adolescence

The second reading for Module 8 discusses evidence related to the factors associated with adolescent alcohol use and binge drinking. You should recall the evidence from early in our course indicating that the probability of developing an alcohol use disorder is highest when drinking begins early in life. The probability of experiencing alcohol dependence during a person's lifetime is four time greater if drinking began before age 15 years, compared to individuals whose drinking is delayed to age 21 years; the probability is reduced by 14 percent with each increasing year of age at first use (Windle & Zucker, date unknown). Evidence also indicates that alcohol exposure during the developmental period of brain remodeling (associated with puberty) leaves individuals more vulnerable to long-term behavioral health problems that include, but are not limited to, substance use disorders-especially if drinking begins before age 11 (Guttmannova et al., 2011).

The National Survey on Drug Use and Health (NSDUH) survey results from 2015 show past-year *alcohol use initiation* occurred among an estimated 9.5% of 12-17 year olds, almost one in ten adolescents

(SAMHSA, 2017). Another piece of evidence making this an important topic is a recent article by Jackson, Barnett, Colby, & Rogers (2017) indicating that children who have even been sipping alcohol (often with parental consent) by the 6th grade have a significantly greater odds of drinking full drinks, getting drunk, and drinking heavily by the time they are in 9th grade. In other words, according to the study's authors, early sipping is not the protective factor that many parents believe it to be; "offering even just a sip of alcohol may undermine messages about the unacceptability of alcohol consumption for youth" (p. 212).

The piece assigned for you to read in this chapter also has relevance to our Module 7 discussions about what makes sense in planning for the prevention of alcohol use disorders. The assigned piece is Patrick, M.E., & Schulenberg, J.E. (2013). Prevalence and predictors of adolescent alcohol use and binge drinking in the United States. Alcohol Research: Current Reviews, 35(2), 193-200.

In this chapter you will read brief entries about:

- recent results and trends from the Monitoring the Future study
- the influence of parents, peers, school, work, religiosity and community attachment and the difference between exercise versus sports participation on adolescents' use of alcohol
- risk-taking and sensation seeking
- drinking attitudes and reasons for using alcohol

- long-term consequences of alcohol use
- implications for prevention and intervention, and
- key terms related to alcohol use, alcohol misuse, and alcohol use disorders.



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Ch. 3: The Role of Social Media (Twitter)

In Module 6 we looked at theory about the impact of social context on substance use behavior. This current chapter draws from Module 6: it looks at the potential of Twitter chatter to have an impact on peer drinking, operating through social norms and social learning theory. The important parts of this piece for our purposes are the abstract, introduction, results, and discussion. The piece is Cavazos-Rehg, P.A., Krauss, M.J., Sowles, S.J., & Bierut, L.J. (2015). "Hey everyone, I'm drunk: An evaluation of drinking-related Twitter chatter. *Journal of Studies on Alcohol and Drugs*, 76(4), 635-643.

In this chapter you will read about:

- the place of online social networks in our understanding of the role social contexts play in substance use behavior
- the "pro alcohol" bias in Tweets
- alcohol marketing in the Twittersphere
- implications for addressing/preventing alcohol misuse
- key terms related to alcohol use, alcohol misuse, and alcohol use disorders.



<u>Click here for a link to our Carmen course</u> where you can locate the assigned pdf file(s) for this chapter. You will need to be logged into our Carmen course, select Module 8, and proceed to the Coursework area. Under the Readings heading you will find a box with links to the readings for relevant coursebook chapters. Don't forget to return here in your coursebook to complete the remaining chapters and interactive activities.



- What does it mean that "on-line social networks can influence the spread of drinking behaviors up to three degrees of separation (i.e., friends, and friends of friends) from page 635 of the article?
- 2. How does the following statement relate to the theories studied in Module 6: "exposure to drinking-related content on social media is common and contributes to the normalization of drinking among young people" from page 635 of the article?
- 3. What are the implications of the statement "the number of pro-drinking Tweets was more than 10 times the number of anti-drinking Tweets" from pages 640-641 of the article?

Ch. 4: The Role of Drinking Context

The next reading is on a quite different topic from what we have been reading so far in Module 8. This piece is included here only in part because sexual aggression perpetration is a very important social issue. The other major reason why it is included here is because it makes a strong case for drinking contexts having a great deal to do with drinking outcomes, perhaps even more than drinking dose (how much and how fast someone consumes alcohol). We have focused a lot of attention on alcohol as a drug so far, but this chapter addresses cultural and social aspects of alcohol use-reminding us that we cannot really understand the consequences of drinking behavior without understanding the contexts in which it occurs. The most important parts of this piece to attend to are the abstract, introduction, results, and discussion. The piece assigned for this chapter is Testa, M., & Cleveland, M.J. (2017). Does alcohol contribute to college men's sexual assault perpetration? Between- and within-person effects over five semesters. Journal of Studies on Alcohol and Drugs, 78(1), 5-13.

In this chapter, you will read about:

• evidence concerning heavy episodic drinking

(HED) and sexual aggression

- the role of drinking context (parties and bars) in sexual aggression
- the role of personality characteristics in sexual aggression and drinking behavior
- key terms related to alcohol misuse and sexual aggression



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- 1. What is the "alcohol myopia model"?
- 2. Which is more important in predicting sexual assault perpetration: whether a man has been drinking heavily or the place/context where the drinking occurs? Which contexts are the "riskiest" in terms of predicting sexual assault perpetration—in other words, are there "hot spots" for sexual victimization?
- 3. How do alcohol expectancy effects possibly play a role in sexual assault perpetration?

Ch. 5: Summary

In this Module 8 coursebook, you learned some basic principles about alcohol, alcohol use, alcohol misuse, and alcohol use disorders. After reviewing information about relative frequency of alcohol and/or other substance use disorders, we explored basic principles concerning the pharmacology of alcohol. This led to an exploration of the effects of alcohol on the human body and behavior. The effects we learned about included the short- and long-term effects of acute and chronic use of alcohol. Next, we turned our attention to what matters regarding early initiation of alcohol use (during puberty and adolescence) and how early exposure can result in lifelong consequences. One factor that tends to promote alcohol misuse during adolescence and emerging adulthood was next in our list of topics: how social media (Twitter in particular) may play a role by influencing both social norms and social learning. Finally, we examined one source of evidence concerning the significance of drinking contexts in determining drinking consequences-we looked at this issue in light of data about drinking and the perpetration of sexual aggression.

You are now ready to review some of the key

terms related to substance use disorders introduced in this book.

Module 8: References

- Cavazos-Rehg, P.A., Krauss, M.J., Sowles, S.J., & Bierut, L.J. (2015). "Hey everyone, I'm drunk." An evaluation of drinking-related twitter chatter. Journal of Studies on Alcohol and Drugs, 76(4), 635-643.
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Module 8: Key Terms

alcohol use initiation: used alcohol for the first time, started using.

- **heavy episodic drinking (HED**): binge drinking; defined in many studies as drinking 5 or more drinks in a single occasion.
- **sexual aggression**: unwanted contact, attempted intercourse, or intercourse using verbal, physical force, and/or incapacitation tactics.

MODULE 9: SEDATIVE/ HYPNOTICS AND CNS DEPRESSANTS

Theories and Biological Basis of Addiction | 235

Module 9: Introduction

The reading for Module 9 introduces concepts essential for understanding the nature of sedative-hypnotic and central nervous system depressant substances, their use and misuse, and their effects. This online textbook includes content prepared by the book's author, as well as several readings from the published literature.

Module 9 Reading Objectives

After engaging with these reading materials and learning resources, you should be able to:

- Explain the nature and actions/effects of sedative/hypnotic and CNS depressant substances
- Identify patterns in the United States of use and misuse of these substances
- Describe the relevance of key pharmacokinetic and addiction principles;
- Define several key terms related to substance use disorders.

Ch. 1: Introducing Sedative/Hypnotics and CNS Depressants

The first reading for Module 9 is valuable in that it addresses a range of important issues and concepts related to the class of drugs we call sedatives/ hypnotics and <u>central nervous system (CNS)</u> <u>depressants</u>. This topic follows Module 8 about alcohol, which you should recall, is also a central nervous system depressant. So, much of the Module 9 content is relevant to Module 8, and vice versa. This first chapter reading is Dupont, R.L., & Dupont, C.M. (2005). Sedatives/hypnotics and benzodiazepines. In R.J. Frances, S.I. Miller, & A.H. Mack, (Eds.), *Clinical textbook of addictive disorders, third edition*, (pp. 219-242). NY: Guilford Press.

In this first chapter will read about:

- the nature of the sedative/hypnotic and <u>benzodiazepine</u> substances;
- distinguishing between medical and nonmedical use (*prescription abuse*);
- the relevance of two *pharmacokinetic* principles (speed of onset & persistence) which are relevant to many types of substances, not only to the

sedative/hypnotic and CNS depressants;

- principles of abuse and addiction (reinforcement, withdrawal, tolerance) with relevance to many types of substances, not only to the sedative/ hypnotic and CNS depressants;
- effects of long-term use
- key terms used in the field of substance use disorders and addiction.



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An interactive or media element has been excluded from this version of the text. You can view it online

here:

https://ohiostate.pressbooks.pub/swk3805coursebook/?p=264

Ch. 2: Club Drugs

This chapter is specific to those "club" drugs that have sedative/hypnotic effects: GHB, Ketamine, and Rohypnol. The assigned piece is presented in the NIDA DrugFacts series (2014). In this piece you will read about:

- Effects of GHB, Ketamine, and Rohypnol and how they are abused
- addiction and withdrawal concerns
- Monitoring the Future (2014) trends in their use



<u>Click here for a link to our Carmen course</u> where you can locate the assigned pdf file(s) for this chapter. You will need to be logged into our Carmen course, select Module 9, and proceed to the Coursework area. Under the Readings heading you will find a box with links to the readings for relevant coursebook chapters. Don't forget to return here in your coursebook to complete the remaining chapters and interactive activities.

Ch. 3: More About Sedative/Hypnotic and CNS Depressant Drugs

This chapter updates some of the information presented in earlier chapters and introduces a few more topics. In this chapter you will read about:

- more effects of these substances (including problems with driving under the influence)
- additional substances (non-benzodiazepine sleep medications, Quaaludes)
- polydrug use
- suicide risk
- key terms used in the field of substance use disorders and addiction.

More on Effects of These Substances

The topics of prescription drug abuse and the drugs known as sedative/hypnotics and CNS depressants overlap considerably. Whether prescribed or used (illegally) without a prescription, a drug still has the same actions on the brain, body, and behavior. The description below comes from a presentation to Congress by the director of the National Institute on Drug Abuse (NIDA), Dr. Nora Volkow, on September 22, 2010:

CNS depressants, typically prescribed for the treatment of anxiety, panic, sleep disorders, acute stress reactions, and muscle spasms, include drugs such as benzodiazepines (e.g, Valium. Xanax) and barbiturates (e.g., phenobarbitol)-which are sometimes prescribed for seizure disorders. Most CNS depressants act on the brain by affecting the neurotransmitter gamma-Aminobutyric acid (GABA), which works by decreasing brain activity. CNS depressants enhance GABA's effects and thereby produce a drowsy or calming effect to help those suffering from anxiety or sleep disorders. These drugs are also particularly dangerous when mixed with other medications or alcohol; overdose can suppress respiration and lead to death. The newer non-benzodiazepine sleep medications, such zolpidem (Ambien), eszopiclone as (Lunesta), and zalepon (Sonata), have a different chemical structure, but act on some of the same brain receptors as benzodiazepines and so may share some of the risks-they are thought, however, to have fewer side effects and less dependence potential.

Driving Under the Influence of Medications

News reports in recent years have identified potential problems with *non-benzodiazepine sleep medications*. Sleeping medications like Ambien were reportedly involved in car crashes where Tiger Woods and Kerry Kennedy were reportedly driving under the influence of these legal substances. While it is clear to most of us that driving under the influence of alcohol is a bad idea (and illegal), too often people overlook the potential dangers associated with driving under the influence of other legal substances and prescription medications. The Automobile Association of America (AAA, 2014) reported that, while 66% of people consider driving under the influence of alcohol to be a very serious threat and 56% considered driving under the influence of illegal drugs to be so, only 28% consider driving under the influence of prescription drugs to be a very serious threat. They report that the crash risk increases by up to 41% for driving under the influence of certain antidepressants, and even over-the-counter cold and allergy medications can impair driving. The dangers also apply to operating any dangerous equipment or machinery, not only motor vehicles.

While their addictive potential may be less than for some of the other substances in this category, nonbenzodiazepine sleep medications are not necessarily "safe" drugs across all types of risk. The increased risks are present even for people who take fewer than two pills monthly-they are still three times more likely to die than people who do not use these substances at all (Kripke, Langer, & Kline, 2012).

Quaaludes

One substance that we have not discussed so far is the sedative-hypnotic called methaqualone (known by the brand name Quaaludes, or by the street name "ludes" or "sopers"). Like the other drugs you are learning about in this module, overdose is possible with this substance, causing symptoms on a continuum of delirium, convulsions, kidney failure, coma, and death. This drug has been in the news recently because it is the substance that Bill Cosby admitted to administering to a number of women either without their knowledge or without their knowledge of the expected effects.

Polydrug Use

What is particularly important to know, especially given the "club" drug culture surrounding use, is that it takes
only ¼ as much of certain drugs when combined with alcohol to induce coma. A large percentage of drugrelated deaths and fatal overdose situations involved the combination of opioids or heroin with benzodiazepines. This point is important across our course:**polydrug use** is potentially very risky. Combining alcohol with the use of any of the substances we are studying is a form of polydrug use.

Risk of Suicide

Non-medical use (prescription abuse) of sedativehypnotic medications is a significant risk factor for suicide, as is the abuse of alcohol (Dodds, 2017): sleeping pills and other sedative drugs is associated with a three-fold higher risk of suicide attempt. According to a recent review of literature (Dodds, 2017), the increased risk of attempted or completed suicide seems to be present with prescribed use, as well. It is not clear whether different specific medications have different associated risk, only that the class of substances (particularly benzodiazepines) has this increased risk. The picture is further complicated by the difficulty in many instances of separating accidental overdose deaths from suicide attempts resulting in death. We do know that the rate of death from benzodiazepine overdose has climbed in recent years (see Figure 1).

Figure 1. Trend in U.S. overdose deaths from benzodiazepines (NIDA, 2017)



Ch. 4: Summary

In this Module 9 coursebook, you learned some basic principles about the class of substances called sedative/hypnotic and central nervous system depressants. We explored which drugs fall into this category, including some of the "club" drugs. Topics discussed included the nature and effects of these substances. Our discussions also introduced concepts that are relevant across many types of substances, not just this particular class of substances This included some basic pharmacokinetic principles, issues of polydrug use, prescription versus non-prescription use of medications, driving under the influence. accidental overdose, and suicide risks.

You are now ready to review some of the key terms related to substance use disorders that were introduced in this book.

Module 9: Key Terms

- **benzodiazepines**: a type of central nervous system depressant psychotropic drugs that produce sedative/hypnotic effects, sometimes used to treat anxiety; for example, Xanax, Valium, Librium, Ativan, Klonopin.
- **central nervous system (CNS) depressants**: psychotropic drugs that slow down or reduce activity in the brain; for example, alcohol, benzodiazepines, barbiturates.
- **driving under the influence (DUI)**: a criminal offense associated with operating a motor vehicle while a person's ability to safely operate the motor vehicle is impaired by alcohol or other substances; also may be identified as driving while impaired (DWI).
- **non-benzodiazepine medications**: a class of sedative/ hypnotic drugs usually used to promote sleep which have many of the same effects as benzodiazepines but may have fewer associated risks; for example, Ambien, Sonata, Lunesta.
- **persistence**: how long a substance remains active in the body; related to the pharmacokinetic principle of drug half-life.
- **pharmacokinetics**: science and principles of pharmacology addressing how drugs are acted upon by the human body, including rates of drug

absorption, distribution, metabolism, breakdown, and excretion/elimination.

- **polydrug use**: using two or more psychotropic substances in combination, usually with the intent of achieving a particular effect; alcohol is commonly involved in polydrug use scenarios.
- **prescription abuse**: the use of a controlled substance (medication) without a prescription, in a manner other than was prescribed, or for the purpose of altering feelings/experience.
- **speed of onset**: a pharmacokinetic principle related to how quickly a drug's effects are first experienced by the user; this varies by type of substance, but is also powerfully influenced by mechanism of administration (e.g., orally, intravenously, inhaled)
- **tolerance**: when repeated use of a substance leads to a person having diminished response such that less effect is experienced by the same dose and/ or higher doses are needed to achieve the same effect; one of the diagnostic criteria for substance use disorders.
- **withdrawal**: the cluster of symptoms experienced when a substance dose is decreased or when its use is stopped completely; not experienced with all substances; one of the diagnostic criteria for substance use disorders.

Module 9: References

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MODULE 10: STIMULANT SUBSTANCES

Module 10: Introduction

The reading for Module 10 introduces concepts essential for understanding the nature of various stimulant substances-amphetamines, "uppers," methamphetamine, cocaine, tobacco, and caffeine. Yes, those last two are included in this module because of the nature of their effects on human behavior and the body. This online coursebook includes content prepared by the book's author, as well as several readings from the published literature.

Module 10 Reading Objectives

After engaging with these reading materials and learning resources, you should be able to:

- Explain what stimulant substances are, how they work, and their effects on the brain, body, and behavior
- Identify epidemiological patterns in the use of various stimulant substances
- Identify specific characteristics of amphetamines, methamphetamine, cocaine, tobacco, and caffeine
- Discuss the potential risks associated with mixing alcohol and energy drinks
- Define several key terms related to substance use, substance misuse, and substance use disorders.

Ch. 1: Introduction

The first reading for Module 10 presents information about stimulant substances, the epidemiology of stimulant drug use, and the effects of these substances on human bodies and behavior. This topic overlaps to some extent with our discussion of prescription drug abuse to come in Module 13. However, there are many forms of stimulant substances: some are completely legal and unregulated (like coffee and tea), others are semi-regulated (like age restrictions on tobacco products and products requiring a prescription), and some are highly regulated (illegal to manufacture/ distribute or possess without a prescription, like methamphetamine). In this way, Module 10 overlaps with the Schedule of Drugs content presented in your Module 9 lecture content.

In this first chapter you will read about:

- The general class of stimulant substances
- Why stimulants might be used in treating attention deficit disorder (ADD) and attention deficit hyperactivity disorder (ADHD)
- Epidemiological patterns in the use of amphetamines, methamphetamine, cocaine, tobacco, and caffeinated beverages
- Key terms related to the class of stimulant substances.

Introduction to Stimulant Substances

Stimulant substances are generally those with psychoactive effects of increasing alertness, attentiveness/attention, and energy level. Some of



these substances are naturally occurring, while others are manufactured or synthetic. <u>Amphetamines</u> are synthetic drugs that affect the levels of at least four major neurotransmitter systems in the human brain: <u>serotonin, epinephrine, norepinephrine, anddopamine.</u> You have been learning about these neurotransmitters throughout our course, especially in Module 3 and 4. <u>Methamphetamine</u> is a specific form of amphetamine. <u>Cocaine</u> is another stimulant substance, drawn from a naturally occurring source: erythroxylum plants (coca, *laetevirens*, or novogranatense variants).

It should not be surprising, therefore, to find that other types of plants also can have stimulant effects: tobacco



leaves(*nicotiana tabacum* plants) and coffee beans (coffea plants), for example. Chocolate comes from yet

another bean: that of the cacao or cocoa plant (theobroma cacao trees).

Stimulant substances have been used medicinally for many generations and across many cultures. In the United States, stimulants have been prescribed to treat several conditions, including attention deficit disorder (ADD), attention deficit hyperactivity disorder (ADHD), narcolepsy, some forms of depression, respiratory problems (including asthma), and as a weight management/weight loss aid.

Significant side effects are associated with the use of amphetamines and other stimulant substances, however. Addiction is one concern. For many of these substances, tolerance



develops quickly so individuals use increasingly higher doses to experience the desired effects. Many people experience withdrawal symptoms when stimulants are discontinued: fatigue, depression, headaches, and disrupted sleep patterns are common.



Another possibility that individuals may experience when using stimulant

substances (even as prescribed medications) is a significant change in psychological functioning. This might include feeling restless and jittery, mood swings, irritability, and paranoia. Sometimes psychosis is triggered by the use of stimulant drugs. These effects of stimulant "uppers" may lead a person to try using another class of substances to manage them-that would be the substances sometimes called "downers" (CNS depressants) that we studied in Module 9. The emotional effects of stimulant medication pharmacokinetics (rise and fall of levels circulating in the body) is also a reason for the development of extended release stimulant medications: for example, Ritalin® comes in an extended release formulation to even out the effects. Extended release forms of medications are intended to make the therapeutic effects last longer and taper off more gradually. Extreme emotional fluctuations are often experienced by individuals (especially children and adolescents) as a function of their medication blood levels dropping below a therapeutic threshold as the medications are broken down (metabolized) in the body over time-an experience called "crashing" is characterized by a sudden, intense drop in mood, tearfulness, increased symptoms of whatever is being treated with the early withdrawal sometimes medication, and symptoms.

There also are general physiological changes that come with using stimulant substances to consider. For example, these substances reduce appetite, increase heart rate.



increase blood pressure, and increase body temperature for most people. This places increased risk of cardiac problems (irregular heartbeat, accelerated heart rate, heart attack), hyperthermia (overheating), and seizures on our list of concerns, along with malnutrition or otherwise unhealthy weigh loss. Children taking stimulant medications may be slow to grow and their progression into puberty may be delayed.

Many of the experienced physiological symptoms are a result of stimulant substances on the human *autonomic nervous system* (ANS). This is the nervous system that manages autonomous (automatic) bodily functions—the ones that we do not have to consciously think about. This would be things like maintaining breathing, heartbeat, blood pressure, body temperature, sweating, digestion, and kidney/urinary functions. Two complementary divisions of the ANS allow regulation of body functions in response to internal changes or changes in the environment (this regulation we called homeostasis in our earlier modules). The <u>sympathetic nervous system</u> runs at a baseline level to help maintain homeostasis. In addition, this system can gear up to create a rapid "fight or flight" stress response to events or stimuli in the environment.

The



parasympathetic nervous system helps bring the body back to its homeostatic resting baseline after arousal. What is the role of stimulant substances in all of this? Most of these substances stimulate the sympathetic nervous system as if there actually were an event warranting a "fight or flight" stress response. The way that these drugs affect the sympathetic nervous system is through their influence on the neurotransmitters *epinephrine* and*norepinephrine*. Norepinepherine, when acting as a neurotransmitter, is involved in promoting focused, "vigilent" concentration. This contributes to their often being misinterpreted as "intelligence" producing substances.



Why would we treat ADD or ADHD with stimulant



medication? It seems rather paradoxical or counterintuitive on the surface-a bit like pouring lighter fluid on an already burning fire. Medications like Ritalin®, Concerta®, Adderall®, and Dexedrine® work by increasing the dopamine levels in the brain. Dopamine is responsible for cognitive alertness. This dopamine release improves a person's attention, motivation, and ability to focus. In turn, this directly helps people improve in a whole lot of performance areas, but it also helps more indirectly, as well.



For example, it improve can а person's ability respond to appropriately to social cues, ability to stay on task in school or work activities. ability to control

impulsiveness, social relationships, self-esteem, selfconfidence, and self-image. Medication alone is not sufficient to manage ADD or ADHD. A lot of hard work to learn coping and self-management skills is also necessary; the medication gives the person a chance for behavioral interventions to be effective. Without medication it is more difficult, but not impossible, for a person with ADD or ADHD to focus attention needed to learn these new intentional behaviors and skills.

People vary widely in their level of response and improvement with this form of medication—some people improve dramatically, others only slightly, and some not at all. However, systematically tested evidence indicates that these performance improvement (cognitive enhancement) effects are not present in individuals who do not have ADD or ADHD-despite widespread popular beliefs (NIDA, 2014). Use of these drugs by this population can actually stimulate hyperactivity while the drug is in their systems. And, of great concern with this form of amphetamine prescription abuse: we have learned that substances with the effect of increasing dopamine also have an increased probability of addiction because of the drug's effects on the pleasure centers of the brain.

Epidemiological Patterns

Because there are so many different types of stimulant substances to consider, we need to look at the data concerning their use patterns separately. The NSDUH data (SAMHSA, 2016) indicates that over 1.65 million individuals aged 12 and over misused stimulant drugs in the past month. While males (877,000) did outnumber females (776,000), the ratio by gender was not markedly different.

Think about it, Part 1: Before you read further, spend a moment making note of your own guesses about each of the following epidemiological patterns.

• Place these substances in the order you believe they fall from most to least commonly used by individuals in the United States: amphetamine prescription abuse, methamphetamine, cocaine, tobacco, and caffeinated beverages.

- For each substance, which gender do you think reports the highest rate of misuse?
- For each substance, which racial/ethnic group do you think reports the highest rate of misuse?

Amphetamines/Methylphenidate: The 2015 data indicate that just over 5 million persons aged 12 and older reported current or recent (past month) amphetamines prescription misuse of or methylphenidate (SAMHSA, 2016). Extrapolating from other proportions in the study, this translates to about 1.67% of the population studied. About 500,000 were adolescents aged 12-17 years. There were about 2.5 million in the 18-25 year age group and 2.2 million in the group aged 26 and older.



Methamphetamine: Almost 900,000 individuals (0.3%) aged 12 and over recently (past month) used methamphetamine according the 2015 NSDUH survey (SAMHSA, 2016). This most often was reported in large metropolitan areas (461,000) and least often in nonmetropolitan areas (160,000), with small metropolitan areas falling in between (276,000).

Regionally, methamphetamine use was most common in the South (375,000) and West (358,000) of the United States and least common in the Midwest (102,000) and Northeast (62,000). Use by males was at a rate more than double that for females, and the largest group using methamphetamine was white.



Cocaine: Looking at the 2015 NSDUH data (SAMHSA, 2016) we can see that an estimated 1.88 million persons (0.7%) aged 12 and over engaged in current or recent (past month) use of cocaine. Twice as many were males compared to females in this group, with the most common racial/ethnic group being white (not Hispanic or Latino), and the largest group being employed full-time. Crack cocaine use was relatively uncommon (394,000) among those aged 12 and over.

Tobacco: Almost 64 million individuals (24%) aged 12 and older reported recent (past month) use of tobacco products in the 2015 NSDUH survey (SAMHSA, 2016). The vast majority (52 million or



19%) used cigarettes. This is in comparison to cigars (4.7%), smokeless tobacco (3.4%) or pipe tobacco (0.8%). Figure 1 shows the age breakdown of those reporting past month tobacco use.

Figure 1. Past month tobacco use by age group (percent)



Caffeine: We have to turn to other sources to estimate the use of caffeinated beverages in the United States; the NSDUH survey does not ask about these substances. In a 2010-2011 population-based study, an estimated 85% of the U.S. population consumes at least one caffeinated beverage daily, with coffee being the primary contributor (Mitchell, Knight, Hockenberry, Teplansky, & Harman, 2014). Over the years, research has vacillated about the health benefits versus risks of drinking coffee. In studies that suggest benefits, the caffeine is not the factor contributing to protecting one's health-it is other components in the coffee, many of which are still present in decaffeinated coffee, depending on the method used to decaffeinate the product (Gunter et al., 2017). And, the health risks accumulate with the flavorings we might add, such as high fat and calorie dairy and caloric sweeteners.

In



addition to coffee, carbonated soft drinks, tea, and energy drinks/energy shots account for most of the caffeine consumed. Tea and carbonated soft drinks (like colas, Sunkist® orange, Dr. Pepper ® and Mountain Dew®) accounted for a great percentage of caffeine consumed by children and adolescents in the United States. Energy drinks accounted for less than 10% of the caffeine consumed by any age group, with the greatest use of energy drinks appearing in the 13-17 and 18-24 year old groups.



Now compare your predictions to what you read.

- The order they fall from most to least commonly used by individuals in the United States: caffeinated beverages (85%), tobacco (24%), amphetamines (1.67%), cocaine (0.7%), and methamphetamine (0.3%).
- For each substance except caffeinated beverages

(that study did not analyze by gender), males more frequently reported using than females.

• For each substance, white non-Hispanic/non-Latino individuals most frequently reported using (except caffeinated beverages, that study did not analyze by race/ethnicity).

Substance Use Disorders Involving Stimulants

These stimulant use patterns, however, are only part of the picture. It is important to know how frequently people developed stimulant-related substance used disorders, too. Let's look at the data from the NSDUH (SAMHSA, 2016) survey on this point.

- 29 million individuals met criteria for nicotine (cigarette) dependence; this is over half (55.7%) of persons who reported recent (past month) smoking of cigarettes.
- 896,000 individuals aged 12 and older met criteria for a substance use disorder involving cocaine; 702,000 were in the 26 and older age group.
- 872,000 individuals aged 12 and older met criteria for a substance use disorder involving methamphetamine.

• 426,000 individuals aged 12 and older met criteria for a substance use disorder involving simulant prescription misuse.

Age at Initiation

Finally, because we know that age at first use of substances plays a significant role in the probability of developing a substance use disorder, it is helpful to know the patterns in when young people start using. The 2015 NSDUH survey (SAMHSA, 2016) data indicate the following:

- 1.26 million persons initiated stimulant misuse during the past year; this represents 0.5% of the population
- 276,000 initiates of stimulant misuse were aged 12-17 years
- 600,000 initiates of stimulant misuse were aged 18-25 years
- 384,000 initiates of stimulant misuse were ages 26 or older

Perceived risk is considered to be one of the protective factors related to substance use initiation. However, among persons who began smoking cigarettes during the past year, 645,000 perceived there to be great risk in smoking one or more packs per day. Among persons who never initiated smoking, 779,000 held this perception. Perhaps those who initiated smoking did not believe there to be much risk in smoking less than a pack per day and did not anticipate eventually smoking in what they considered to be a high-risk pattern.

Among persons who initiated cocaine use during the past year, 228,000 perceived there to be great risk in using once a month and 478,000 perceived this level of risk associated with using once or twice a week. Individuals who never initiated cocaine use MUCH more commonly held the belief that it was used at great risk.



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Ch. 2: Cocaine

The focus of this chapter is cocaine. While it is not the most commonly misused of the stimulant substances, its misuse is associated with considerable numbers of persons experiencing serious physical health, mental health, and life problems as a result. Thus, this substance warrants a closer look. The reading selected for this chapter is from the National Institute on Drug Abuse and is simply titled *Cocaine* (NIDA, 2016).

In this chapter you will read about:

- what cocaine is and how it is used
- statistics about the use of cocaine in the United States
- cocaine's effects on the brain, short- and longterm effects of use, and how the effects of cocaine are produced
- risk of communicable diseases with cocaine use (HIV/AIDS and hepatitis)
- effects of maternal cocaine use



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Ch. 3: Methamphetamine

This chapter is focused specifically on the topic of methamphetamine. While methamphetamine (meth) is not the most commonly misused of stimulant substances, there exists a sizeable population of individuals, families, and communities experiencing powerfully negative consequences. The contents of this chapter are in the NIDA (2013) Research Report Series article about methamphetamine.

In this chapter you will read about:

- what methamphetamine is and how it is abused
- danger in the manufacture of methamphetamine
- how methamphetamine compares to other stimulant substances
- short- and long-term effects of methamphetamine, including the dopamine pathways involved
- risks associated with methamphetamine use during pregnancy
- risk for communicable diseases (HIV/AIDS and hepatitis) with methamphetamine use



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Ch. 4: Tobacco and Nicotine

In this chapter you will read two articles from the National Institute on Drug Abuse. The first discusses tobacco: specifically, nicotine (NIDA, 2016). The second is about a relatively new phenomenon-the e-cigarette. While some people believe that the e-cigarette represents a harm reduction approach to smoking and nicotine addiction, evidence about the level of harm associated with using e-cigarettes is growing. This is the topic of our second reading in this chapter (NIDA, 2017).

In this chapter you will read about:

- The epidemiology of tobacco/nicotine use (from data a bit older than was presented in chapter 1)
- Effects of tobacco use, including addiction
- Tobacco use and other health risk behaviors, comorbidity, and pregnancy
- Treatment approaches for nicotine addiction
- E-cigarettes

Two additional points to consider when you review the second article:

• The batteries used in some-cigarette brands have

been known to malfunction, just as some other forms of rechargeable battery products recently in the news, causing fires, burns, and injuries (they are banned on airplane flights).

• The liquid nicotine ("e-juice") use in e-cigarettes is highly toxic to young children and pets if they are exposed to it. The nation's poison control centers report a sharp increase of 1500% in calls about this type of overdose in the 3-year period between 2012 and 2015, usually involving children under the age of 6, and especially children under the age of 2 years (LaMotte, 2016).



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Ch. 5: Caffeine

Our final topic in this module about stimulant substances concerns <u>caffeine</u>.

In this chapter you will read some general information about caffeine that is edited from a pair of NIDA blog sites: The Buzz on Caffeine and Is Caffeine Really Addictive?

In this chapter you will read about:

- Caffeine being the most widely used psychotropic drug in the United States
- Caffeine effects
- Caffeine content of various products (more about this is in your lecture content)
- Caffeine and addiction

Here is what the two blogs had to say.


Question: What's the most widely used drug? It's not marijuana—and it is not tobacco or alcohol either. Nine out of 10 Americans take it in some form every day, and it is not limited to adults.

Hint: According to a recent study published by the American Academy of Pediatrics, nearly three-fourths (75%) of children, teens, and young adults use it daily too-in the form of soda, coffee, and energy drinks.

Answer: Caffeine!

Yes, caffeine is a drug-a stimulant drug, to be exact. It is even possible to be physically dependent on it-which means that a person who is used to drinking lots of caffeinated beverages can experience withdrawal symptoms if they quit.

Caffeine: Breaking Down the Buzz: Caffeine has a perk-up effect because it blocks a brain chemical, adenosine, which causes sleepiness. On its own, moderate amounts of caffeine rarely cause harmful long-term health effects, although it is definitely possible to take too much caffeine and get sick as a result.

Consuming too much caffeine can make you feel jittery or jumpy-your heart may race and your palms may sweat, kind of like a panic attack. It may also interfere with your sleep, which is especially important while your brain is still developing. [And, in injury prevention, as well.]

Some caffeine drinks and foods will affect you more

than others, because they contain very <u>different</u> <u>amounts</u>.

Caffeine Source	Caffeine Content
8 oz black tea	14–70 milligrams (mg)
12 oz cola	23–35 mg
8.4 oz Red Bull	75–80 mg
8 oz regular coffee	95–200 mg
1 cup semi-sweet chocolate chips	104 mg
2 oz 5-Hour Energy Shot	200–207 mg

But it is more than just how much caffeine a beverage has that can make it harmful. Even though <u>energy</u> <u>drinks</u> do not necessarily have more caffeine than other popular beverages (unless you take 8 ounces of 5-Hour Energy Shot®, which has 400 milligrams!), it is the way they are sometimes used that worries health experts. In 2011, of the 20,783 <u>emergency room</u> visits because of energy drinks, 42% were because the user combined them with other drugs (e.g., prescription drugs, alcohol, or marijuana).

Caffeine + Alcohol = Danger: Mixing alcohol and caffeine is serious business. As a stimulant, caffeine has the opposite effect on the brain as alcohol, which is a depressant. But don't think the effects of each are canceled out! In fact, drinking caffeine does not reduce the intoxication effect of alcohol (that is, how drunk you become) or reduce its cognitive impairments (that is, your ability to walk or drive or think clearly). Caffeine does reduce alcohol's sedation effects, so you feel more awake and probably drink for longer periods of time, and you may think you are less drunk than you really are. That can be dangerous. People who consume alcohol mixed with energy drinks are <u>3 times</u> more likely to binge drink than people who do not report mixing alcohol with energy drinks.

Stay Away From Caffeine? Drinking a cup of coffee, or eating a bar of chocolate, is usually not a big deal. But there are alternatives to caffeine if you're looking for an energy burst but don't want to get that jittery feeling caffeine sometimes causes. Here are a few alternatives you can try to feel energized without overdoing the caffeine:

Sleep. This may sound obvious, but getting enough sleep is important. Teens need <u>9 hours of sleep</u> a night.

Eat regularly. When you don't eat, your glucose (sugar) levels drop, making you feel drained. Some people find it helpful to eat four or five smaller meals throughout the day instead of fewer big meals.

Drink enough water. Since our bodies are more than two-thirds H_20 , we need at least 64 ounces of water a day.

Take a walk. If you're feeling drained in the middle of the day, it helps to move around. Do sit-ups or jumping jacks. Go outside for a brisk walk or ride your bike.

Is Caffeine Addictive? Most adults in the U.S. use <u>caffeine</u>, whether in coffee, soda, energy drinks, or chocolate. Many are also familiar with the effects of suddenly drinking less coffee than usual: tiredness, headaches, insomnia, and other symptoms. And many people talk about being "addicted" to their morning coffee or energy drink! But is caffeine truly addictive?

It's all about the dopamine: The world's caffeine obsession can be described as a "<u>dependency</u>" (because when you have less of it, you go through a mild "withdrawal," with the symptoms listed above), but it is *not* usually an addiction [because not enough DSM-5 symptoms are usually involved].

It is true that–like many drugs–caffeine enhances dopamine signaling in the brain. <u>Dopamine</u> is a chemical that helps control movement, motivation, and emotions, so enhanced dopamine signaling makes a person feel more awake and alert. Because caffeine produces that alert feeling, it is classified as a <u>stimulant</u>.

But some <u>prescription drugs</u> and the dangerous drug methamphetamine ("meth") and MDMA (ecstasy or <u>Molly</u>) are also types of stimulants. So what is the difference?

While caffeine produces a small rise in dopamine, it does not cause the large surge that unbalances the reward circuits in the brain and is <u>necessary</u> for an <u>addiction</u>. So even though the word "addiction" is often used casually, caffeine is not truly addictive (scientifically speaking).

It is all in how you define addiction: NIDA defines addiction as the uncontrolled (or "compulsive") use of a substance even when it causes negative consequences for the person using it.

So the difference between caffeine dependence and addiction to drugs like meth is that even a person who loves to drink coffee can do without it, deal with the headaches and irritability that result, and not engage in destructive (or self-destructive) behavior.

<u>Too much caffeine</u>—like too much of anything—can still be harmful. But even if you just must have that energy drink, know that your love of caffeine doesn't compare to a *real* drug addiction that can change your life forever, in very bad ways.



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Ch. 6: Energy Drinks and Alcohol

In this chapter we are going to explore an issue that overlaps with our Module 8 topic: alcohol. If you stop to think about it, you might wonder how the stimulants topic overlaps with the alcohol topic when alcohol is a central nervous system (CNS) depressant. As you learned in chapter 1, it is not uncommon for individuals to try modifying the effects of one substance by using another (antagonist) substance-offsetting the effects of stimulants with depressants, for example. We are looking directly at alcohol and stimulants here because of the relatively common practice among young people who misuse alcohol to mix alcoholic beverages with energy drinks. The article you will review at this point is Roemer, A., & Stockwell, R. (2017). Alcohol mixed with energy drinks and risk of injury: A systematic review. Journal of Studies on Alcohol and Drugs, 78(2), 175-183. The important segments of this article for the purposes of our course are the introduction, results, and discussion. The methodology of a systematic review is relevant to coursework about evidence and evidenceinformed practice.

In this article you will read about:

• increased risk of injury following use of alcohol

mixed with energy drinks (AmED)

• why increased risk of mixing these substances might occur



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What is the major conclusion to

draw from the article's review?

Ch. 7: Summary

In this Module 10 online coursebook, you learned some basic principles about the class of stimulant substances. As you can see, the class of psychoactive stimulant substances is quite diverse. In this Module 10, we explored a number of different substances that fit into this classification:

- amphetamines,
- methamphetamine,
- cocaine,
- tobacco, and
- caffeine.

We learned a bit about the effects of these substances on the human body and behavior. We also looked into the mechanisms by which they have their effects. You read about the different epidemiological patterns by which these different substances are used by individuals in the United States, and may have been surprised by data challenging some stereotypes. Finally, we explored some of the risks associated with the pattern of mixing the stimulants in energy drinks with alcohol.

You are now ready to review some of the key

terms related to substance use disorders introduced in this book.

Module 10: Key Terms

- **amphetamines**: potentially addictive stimulant substances that affect the serotonin, epinephrine, norepinephrine, and dopamine levels in the brain.
- **autonomic nervous system (ANS)**: in contrast to the central nervous system (CNS), this system regulates many of the body's functions that generally operate without us having to consciously think about them (autonomous functions); it is functionally divided between the complementary sympathetic and parasympathetic systems, as well as the enteric nervous system.
- **caffeine**: widely used central nervous system stimulant substance found in food and beverage products that can cause anxiety and sleep disorders.
- **cocaine**: psychoactive stimulant drug derived from natural plant sources; high addictive potential. "Crack" is a form of cocaine.
- **dopamine**: one of the major neurotransmitters; a precursor of epinephrine in the human body.
- **energy drinks**: beverage containing stimulant substances, usually caffeine; may contain other stimulants and sugar, as well.
- **epinephrine**: both a hormone and medication (also called adrenalin as it is produced by the adrenal

gland) but also an excitatory neurotransmitter produced by certain neurons.

- **norepinephrine**: both a hormone and neurotransmitter; plays a role in attentiveness, emotions, sleep, dreaming, learning, and mood disorders.
- **parasympathetic nervous system**: acts in complementary manner to the sympathetic nervous system as part of the autonomic nervous system, calming the system back to homeostatic baseline resting state.
- **serotonin**: one of the major neurotransmitters; plays a role in mood, social behavior, appetite, sleep, memory and sexual function.
- **sympathetic nervous system**: serves as the mechanism for the "fight or flight" response by stimulating breathing and heart rate, and regulating other organ functions to create a state of arousal; part of the autonomic nervous system, complemented by the parasympathetic nervous system.

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MODULE 11: OPIOIDS

Theories and Biological Basis of Addiction | 299

Module 11: Introduction

The reading for Module 11 introduces concepts essential for understanding the nature of opiates, opioids, and narcotics, as well as understanding the problem of opioid abuse and the "opioid epidemic" reported across the United States. This online coursebook includes content prepared by the book's author, as well as several readings from the published literature.

Module 11 Reading Objectives

After engaging with the assigned reading materials and learning resources, you should be able to:

- Explain the similarities and differences between opiates, opioids, narcotics, heroin, and other substances in this category
- Explain features of the nation's opioid epidemic;
- Identify the opioid substances commonly misused and their effects;
- Identify the role of tolerance in the overdose cycle;
- Explain basic principles of Neonatal Abstinence Syndrome (NAS);

• Define key terms related to opioid misuse.

Ch. 1: The Opioid Epidemic

In recent months, news about an opioid <u>epidemic</u> has shaped a large portion of the national discourse and policy at the local, state, and federal levels. Before delving into details about these substances, we will first look at the context presented by the "epidemic narrative." The first reading for Module 11 is a fact sheet prepared by the American Society of Addiction Medicine, *Opioid addiction:* 2016 facts & figures. The second reading is from the National Institute on Drug Abuse (NIDA, 2017) and addresses the nation's opioid crisis.

In this first chapter you will read about:

- the class of opioid drugs;
- epidemiology and economic burden related to opioid addiction;
- the relationship between opioid and heroin misuse;
- the role of <u>fentanyl</u> and<u>carfentanil</u> in opioid overdose rates;
- a brief summary of how this problem came to be¹;
- possible strategies for addressing the problem; and,
- key terms related to opioid misuse and addiction.

As you are doing the readings for Chapter 1, keep several points in mind. First, the purpose of these drugs, initially, was pain control-they were originally prescribed because of their *analgesic* properties. They reduced or eliminated many types of pain from many parts of the body. They work on pain through the endorphin systems that we studied earlier in our coursework. Because of their



side effects (and addictive potential) they are usually reserved for treating severe pain or maybe moderate pain of a short duration. Many physicians were trained to believe that these pain medications were not addictive for patients truly experiencing pain. This mistaken belief, combined with being trained to believe that failing to adequately manage pain was unethical, led to much over-prescribing of these medications. This was only part of the opioid problem spiraling out of control.

Second, while a great deal of attention related to the opioid epidemic is directed toward death statistics, it is also important to remember that death is not the only worrisome outcome. According to Ohio's Franklin County Opiate Action Plan (2017) and other sources:

- The number of deaths due to accidental drug overdose increased by 71% between 2012 and 2016–only a 4 year span;
- This increase is largely driven by deaths due to fentanyl, the highest rate occurring among 25-34 year olds, 70.5% of whom were men;
- At least 3 out of 4 persons who use heroin report first misusing prescription opiates;
- The number of persons infected with Hepatitis C increased by 68% between 2012 and 2016 (from 950 to 1600)
- Neonatal abstinence syndrome (NAS) rates climbed precipitously [from 20 babies per 10,000 live births to 155 babies per 10,000 live births between 2006 and 2015, according to state records described in the news <u>http://wcbe.org/post/</u> <u>rate-ohio-babies-born-addicted-drugs-increasing</u>];
- Children's services report that 70% of children under the age of one year who are in custody have opiate-involved parents and 28% of all children taken into custody had parents using opiates at

the time of removal from the home;

- In 2011, first responders administered an average of 6.55 doses of naloxone per day; in 2016 this rate was up to 10.3 doses per day–largely accounted for by the ever-stronger strains of opiates being used needing more naloxone per person to combat overdose (the average number of incidents requiring naloxone administration increased from 5.2 per day in 2011 to 6.5 per day in 2016);
- Law enforcement seizure of fentanyl events increased from 110 during 2013 to 3,882 in 2015;
- For every overdose death, there were 32 emergency department visits;
- Efforts to obtain heroin and other opioid substances often involves criminal activity (over and above the distribution being illegal), especially property crimes and robbery (stealing from a person);
- Violent crime and weapons are often involved in the illegal distribution of these substances.

Third, the opioid picture is seriously compounded by the emergence of fentanyl and carfentanil (or carfentanyl) onto the scene. Accidental overdose involving these powerful synthetic more opioid substances is all too easy. Fentanyl has 50-100 times the potency of street heroin. Carfentanil has 100 times the potency of fentanyl. Carfentanil was originally formulated to sedate elephants, not for human use. These two drugs are showing up as additives to a variety of "street" drugs-heroin, reconstructed opioid pills, cocaine, and marijuana.

Recently, first responders and drug-detection dogs have experienced overdose events as a result of accidentally coming into contact with even very small quantities of these substances. The photo in Figure 1 comes from the New Hampshire State Police Forensic Lab https://www.statnews.com/2016/09/29/ (see fentanyl-heroin-photo-fatal-doses/). The DEA has issued a nationwide law enforcement alert that breathing in or touching even small specks of fentanyl can cause a fatal overdose-amounts similar to a few grains of table salt (https://ndews.umd.edu/sites/ ndews.umd.edu/files/DEA%20Fentanyl.pdf). Now, imagine the small amount of carfentanil exposure that could be fatal. Finally, think about the implications of these substances being loose in the community-present on discarded drug paraphernalia or contaminating household or auto furnishings. This is similar to an issue we explored when we looked at the community impact of illegal methamphetamine production-these substances represent environmental hazards to others who may not be aware of their presence.

Figure 1. Comparing lethal doses of heroin and fentanyl

"On the left, a lethal dose of heroin; on the right, a lethal dose of fentanyl."



¹ Additionally, you may be interested in reading Sam Quinones' book, *Dreamland: The True Tale of America's Opiate Epidemic*, if you are interested in an analysis of how the nation got from heroin being a back alley drug during the 1970s to "now it's your neighbor's child," and the role of pharmaceutical companies in the developing opioid tidal wave (2015).



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Ch. 2: Introduction to Opioids

This chapter briefly introduces the opioid substances. The contents specifically about opioids come from a longer document published by the National Institute on Drug Abuse (NIDA, 2016) called *Misuse of Prescription Drugs*.

In this chapter you will read about:

- opioid drugs and how they affect the brain/body;
- dependence, addiction, and tolerance;
- opioid misuse and chronic pan;
- the problem of tolerance and overdose;
- injection drug use as a health problem; and,
- key terms used in the field of substance use disorders and addiction.

You might ask, "Why are we reading about tolerance again at this point in the course?" There is a special situation related to opioids and tolerance that warrants attention. This segment written about heroin gets to the point:

> During a period of abstinence (for example, in treatment or in custody), tolerance diminishes quickly so that an individual can easily overdose by taking

their usual dose. Overdose occurs as a result of depression of the respiratory centre [sic] in the brain, which leads to respiratory and cardiac arrest and death unless immediate medical attention is received (Rassool, 2011, p. 73).

In other words, a person who stops taking heroin or other opioid drugs quickly loses the tolerance that may have built up over time. Resuming use at the previous amount of the drug becomes an overdose.

The symptoms of heroin overdose presented in a table by Rassool (2011, p. 73) are:

- shallow breathing or difficulty breathing
- weak pulse and/or low blood pressure
- delirium
- drowsiness
- muscle spasms
- disorientation
- bluish-color of lips and fingernails (from low oxygen levels)
- dry mouth
- pinpoint (small) pupils
- coma.

Rassool (2011) also addressed an additional important issue related to opioid misuse, particularly related to heroin: injection as a common mechanism of heroin administration. Injecting drugs is accompanied by a host of potential health problems, including infection at the injection sites, vein collapse at the injection sites, and contracting or transmitting infectious diseases through "dirty" needle sharing (HIV, hepatitis B and hepatitis C).



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Ch. 3: Heroin

This chapter is focused on one opioid drug: heroin. The reading material is from the National Institute on Drug Abuse (NIDA, 2017) *Drug Facts* report.

In this chapter, you will read about:

- What heroin is and its effects
- How people use heroin, and
- The relationship between prescription opioids and heroin¹.

As you read this piece, consider the conclusion that making the prescription drug OxyContin (oxycodone) more difficult to abuse (harder to dissolve or crush for injection or "snorting") in 2010 may have contributed to a significant uptick in heroin use, therefore an increase in heroin deaths (Evans, Lieber, & Power, 2017).

¹Hopefully, you notice that this reading presents a different picture of the relationship between prescription opioid use and heroin misuse. Earlier you saw that as many as 80% of people using heroin started with prescription opioids. In this reading you see that very few people who use prescription opioids end up using heroin. How do we resolve this apparent contradiction? The first is talking about prescription abuse/misuse: people who have developed an addiction to the opioids and their movement into using heroin.

The second is talking about people who use opioid medications as prescribed (and for only a short course of treatment).



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Ch. 4: Neonatal Abstinence Syndrome (NAS)

Many psychotropic (and other) substances have the potential to wreak havoc on fetal development if used by a pregnant woman. This is true across the entire pregnancy period, though the specific nature and intensity of risks might vary as a function of which of the fetal organ systems are developing at the point of exposure, as well as the dose/duration of exposure. We have discussed this topic of prenatal exposure in each of our modules, and are paying special attention to it in this module because of the importance of knowing aboutNeonatal Abstinence Syndrome (NAS). The piece that you are assigned is presented by the March of Dimes-an organization dedicated to preventing birth defects (March of Dimes, 2017). This is a non-technical piece that can be easily shared with clients or family members.

In this brief chapter you will read about:

- What NAS is and how it is assessed
- Substances that might cause NAS
- Prevention and treatment of NAS

When you read the list of substances presented in this piece, it is important to also consider the fact that some medications used to treat opioid addiction are, themselves, opioid drugs. For example, methadone maintenance therapy (MMT) during pregnancy may be an improvement over "street" opioids (heroin and prescription abuse) for the baby's birth outcomes, but babies exposed in utero to methadone may very well still have to be treated for NAS. Buprenorphine is another form of medication used to treat opioid addiction and has less severe NAS outcomes than methadone (Jones et al., 2012).



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Ch. 5: Alcohol versus Opioid Deaths

Alcohol versus Opioid Deaths

There is one more important point to make as we conclude this topic of opioid problems. While opioid misuse is a critically important issue in the United States, the topic should not be allowed to totally eclipse attention to other substance use problems. For example, alcohol continues to be the cause of illness, injury, and death at a remarkably high rate. As the next article notes, "more than 33,000 Americans died due to alcohol-induced causes in 2015" (Lopez, 2016). The number of opioid-related deaths has been rising fast over the past 15 years, but has yet to surpass the rate of alcohol-related deaths. Here is the weblink information for the story (and a link is provided in your Carmen coursesite, as well):

https://www.vox.com/policy-and-politics/2016/ 12/9/13898956/alcohol-deaths-2015

Ch. 6: Summary

In this Module 11 online coursebook, you learned about the class of substances known as opioids. You read about the various prescription drugs in this class and about heroin, as well. You were also introduced to some of the medications that might be used to help treat opioid addiction. This is a topic we will cover in greater detail in Module 13 when we explore pharmacotherapy and medication assisted treatment (MAT). Much of our attention in Module 11 addressed the nation's encounter with an opioid epidemic-some theories about its origins and ideas for addressing the problem. Then we looked specifically at heroin as one of the opioid substances misused in this country. Tied into these discussions was information about the dangers arising from the introduction of fentanyl (and carfentanil) into the equation. We also directed attention to the problem of Neonatal Abstinence Syndrome (NAS). Finally, we tried to find some balance and context about the problems by reading an opinion piece concerning the relative magnitude of the opioid problem and problems with alcohol.

You are now ready to review some of the key terms related to substance use disorders that were introduced in this book.

Module 11: Key Terms

- **analgesic**: pain relief property of certain medications (aspirin, acetaminophen, ibuprofen, morphine, oxycodone, fentanyl, tramadol, and others).
- **carfentanil**: a derivative of fentanyl, synthesized from morphine; many times more potent by mass than fentanyl; high addictive potential.
- **epidemic**: a widespread disease, disorder, or problem affecting a disproportionately large number of individuals within a population or community at the same time.
- **fentanyl**: synthetic opioid, intended for pain relief; misuse occurs as it is combined with other substances, markedly increasing risk of overdose; high addictive potential.
- **heroin**: opioid drug derived from morphine, illegal in the United States; high addictive potential.

hyperalgesia: abnormally enhanced pain sensitivity.

Neonatal Abstinence Syndrome (NAS): a cluster of problems present in newborn infants who have a history of being exposed to opiate/opioid drugs while in utero; acute withdrawal from the addictive drugs as the placental connection to mother's system is broken at birth.

opiate: substances derived from opium (opium poppy).opioid: substances synthetically constructed to interact with opioid receptors in the human body; term

currently may also apply to substances derived from opium (opiates).

tolerance: when a person's body adapts to use of a specific substance to the point where increased doses are necessary to provoke the same level of response or the response is lessened when the dose remains constant; one criteria used to diagnose substance use disorders (addiction).

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MODULE 12: MARIJUANA, HALLUCINOGENS, INHALANTS, AND STEROIDS

Theories and Biological Basis of Addiction | 327

Module 12: Introduction

The reading for Module 12 introduces concepts essential for understanding the misuse of several different types of substances that are loosely connected in nature, but do not fit neatly into a single grouping or into any of our other groupings. The readings for this module include information about marijuana, hallucinogens, inhalants, and anabolic (androgenic) steroids. This online textbook includes content prepared by the book's author, as well as several readings from the published literature.

Module 12 Reading Objectives

After engaging with these reading materials and learning resources, you should be able to:

- Explain the effects of these substances and how these effects are produced
- Identify trends in data concerning who uses these substances
- Identify additional issues related to each of these substances
- Define several key terms.

Ch. 1: Introduction to Marijuana/Cannabis

Module 12 readings begin with a piece about marijuana (cannabis). We begin here for two reasons: this is the second most commonly used psychotropic substance (after alcohol) and it is currently the topic of much debate in the U.S. (and some other parts of the world). You may recall from Module 1 some of the discussion about historical and contemporary policy approaches to substance use problems-particularly related to alcohol and to marijuana. In this module, you will learn more about the use and misuse of marijuana, knowledge that underlies policy concerns surrounding restriction versus legalization in the U.S. The federal stance, currently, is that marijuana is an illegal substance. A number of states have passed legislation allowing prescribed medical uses for cannabiscontaining substances. A few states have passed allowing recreational legislation use of these substances.

Chapter 1 is the National Institute on Drug Abuse (2017) report called *Marijuana*. This piece covers a number of important and currently relevant topics. In this chapter you will read about:

• What *marijuana* is

- The scope of marijuana use in the U.S.
- Marijuana effects (physical, health, mental health, and social) and how the physical effects are produced
- The addictive potential of marijuana
- The gateway drug debate
- Second-hand marijuana smoke exposure
- Medical marijuana
- Pregnancy issues with marijuana



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Ch. 2: Marijuana in the Community

This chapter extends our discussion of marijuana and the legislative control debates. The purpose of this chapter is to examine what occurs at the community level in terms of crime rates where medical marijuana dispensaries are permitted by law. This article is included because the social work perspective on substance use (and other issues) extends beyond individuals and addresses larger social systems (families, institutions, communities, and global society). The article is Freisthler, B., Ponicki, W.R., Gaidus, A., & Gruenewald, P.J. (2016). A micro-temporal geospatial analysis of medical marijuana dispensaries and crime in Long Beach, California. Addiction, 111, 1027-1035. You will read about the link between medical marijuana dispensaries and crime statistics (violent and property crimes). You should pay particular attention to the Abstract, Introduction, and Discussion sections of this piece-the other sections are of interest especially if you want to learn more about the methods used in geospatial research.



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Based on what you learned in this reading,:

- How would you describe to your roommate or family member the relationship between the number and location of medical marijuana dispensaries and crime rates in the surrounding neighborhoods?
- 2. What questions does this study leave you wondering about this topic?

Ch. 3: Introducing the Other Hallucinogens

This chapter is all about hallucinogenic substances (hallucinogens) and includes discussion of several dissociative substances, as well. The content addresses some naturally occurring substances (psilocybin mushrooms, peyote, salvia divonorum) and others that are synthesized , like LSD,



PCP, ketamine, Ecstasy/MDMA, dextromethorphan (yes, the substance in many forms of cough medicine). Some textbooks refer to many of these substances as "club drugs" because they tend to be used in night club, rave, dance, concert, and party settings. You have already learned a bit about two other "club drug" substances, GHB and Rohypnol (in our Module 9 discussions about sedative hypnotics). These are sometimes referred to as "designer drugs," as well, because of the effort involved in synthesizing them (illegally).

Hallucinogenic substances are most likely to be used by individuals in the emerging adulthood age group, 18–25 years. Here is a figure based on data from the 2015 NSDUH study (see Figure 1). Overall, about ½ of one percent (0.5%) of individuals aged 12 and over reported use of hallucinogens during the past month.



Figure 1. Past month hallucinogen use by age group (percentage)*

*adapted from NSDUH, 2015 data report (SAMHSA, 2016)

The main reading content comes from the National Institute on Drug Abuse (2015), Hallucinogens and dissociative drugs, from the NIDA Research Report Series. In this chapter you will read about:

- Identifying hallucinogenic (and dissociative) drugs and how they work
- Trends in their use (as of 2013 and 2014)
- Short and long term effects of their use

One other important principle that is briefly described in this reading, but not identified as such: crosstolerance. The reading indicates that a person who develops tolerance to one of the hallucinogenic substances automatically has developed at least some related example tolerance to substances. The presented in the reading concerns tolerance to LSD producing tolerance to psilocybin and peyote. The principle of cross-tolerance is important in terms of understanding how medications might or might not work for a person, as well as how various types of substances work (not just hallucinogens).



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Ch. 4: More Club Drugs

In addition to the reading about hallucinogens and dissociative drugs that you completed in Chapter 3, there is a short reading from NIDA (2016) addressing MDMA (Ecstasy, Molly) in particular. In this reading you will learn about this specific "club drug." Especially, take note of what it says about this drug in combination with others.



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Ch. 5: Introducing Inhalants

The topic of inhalant misuse is next on our list. Inhalant misuse potentially includes a wide variety of chemicals: nitrous oxide, cleaning fluids, gasoline, spray paint, computer keyboard cleaner,



felt-tip pens, glues/adhesive sprays, and other aerosol products. Turning to our 2015 NSDUH survey, over a half-million persons aged 12 and older currently (during the past-month) use inhalants—the majority being adolescents aged 12-7 years (see Figure 2). Overall, about 0.2 percent of the population aged 12 and over are estimated to currently use inhalants—so it is not as commonly used as many of the other substances we are studying, but has a tremendously disruptive and destructive potential.

Figure 2. Past month inhalant use by age group (percentage)*



*adapted from NSDUH, 2015 data report (SAMHSA, 2016)

Our reading for this chapter comes again from the National Institute on Drug Abuse (2017) Drug Facts series. In this reading you will learn:

- What the class of inhalants are and how they are misused
- Effects on the brain and other organ systems of inhalant misuse
- The deadliness of inhalants



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How would you explain the problem of inhalant use to a group of middle school students' and their parents, perhaps as a Boy/Girl Scout presentation?

Ch. 6: Introducing Anabolic Steroids

Our next reading contains important information about the use and misuse of anabolic (androgenic) steroids. The reading comes from the National Institute on Drug Abuse (2016) Drug Facts series, and is called Anabolic Steroids. It covers topics such as:



- What (anabolic) steroids are and how they are used
- Brain and other health effects of steroid misuse (for men and for women)
- Addiction and withdrawal experiences



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Ch. 7: Summary

In this Module 12 online textbook, you learned basic principles about a varied group of substances. We explored marijuana, several other hallucinogens, inhalants, and (anabolic) steroids. You are now ready to review some of the key terms related to substance use disorders introduced in this book.

Module 12: Key Terms

- **anabolic steroids**: synthesized substances that mimic testosterone, the naturally occurring male sex hormone; sometimes referred to as anabolic-androgenic steroids because they have the effect of producing masculinization (androgenic) of features and body functions.
- **anandamide**: the naturally occurring brain chemical (endogenous) that functions as a neurotransmitter and is similar in structure to THC (cannabinoids).
- **cannabinoids**: the group of chemicals in marijuana (or synthesized) found in the cannabis (marijuana) plant, as well as those which are endogenous (see anandamide).
- **cross-tolerance**: when tolerance developed to one substance is also expressed toward other, chemically similar substances even though the other substance has never been used.
- **dissociatives**: substances that alter the conscious mind, causing an individual to experience distorted perceptions (sight and sound) and a feeling of detachment (dissociation) from self, body, and environment; may also cause hallucinations.
- **hallucinogens**: a type of synthetic or naturally occurring substance that causes significant distortions in a person's perceptions of reality

(usually visual and/or auditory), perception of what is not really present or what actually is present as being very different in nature; mimicry of psychotic states.

- **inhalants**: substances that produce chemical vapors (volatile substances) and that cause psychotropic effects when inhaled by nose or mouth; many are highly toxic to the brain and other organ systems, as well; many are common household or workplace products.
- **marijuana**: in the class of cannabinol substances with the active ingredient being THC (delta-9-tetrahydrocannabinol).
- **THC:** is short for the chemical delta-9-tetrahydrocannabinol, a major active ingredient contributing to the psychoactive effects of cannabis (marijuana) by attaching to cannabinoid receptors in the brain.

Module 12: References

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MODULE 13: OTC AND RX ABUSE AND PHARMACOTHERAPY AND DETOX

Theories and Biological Basis of Addiction | 353
Module 13: Introduction

The reading for Module 13 introduces concepts essential for understanding over-the-counter and prescription drug misuse, pharmacotherapy as an option in treating substance use disorders, and the specific phase of treatment called detoxification ("detox"). This online coursebook includes content prepared by the book's author, as well as several readings from the published literature.

Module 13 Reading Objectives

After engaging with these reading materials and learning resources, you should be able to:

- Explain the roles of prescription and over-thecounter medications in the substance misuse arena;
- Identify basic principles of pharmacotherapy for treating substance use disorders;
- Identify goals and practices of detox protocols;
- Define several key terms related to these topics.

Ch. 1: Introduction

This chapter offers an organizing framework for both new and familiar material; it includes both brief reminders of some points learned in earlier modules and recorded lecture content, as well as introducing several new points.

In this chapter you will read about:

- Distinctions, commonalities, myths and facts about misuse of prescription and over-thecounter (OTC) substances
- Approaches to addressing prescription drug abuse, and
- Key terms used in the field of substance use, substance misuse, substance use disorders and addiction.

Prescription and Over-the–Counter (OTC) Drugs



Let's begin with debunking a common myth: many people believe that **overthe-counter drugs** sold in

general drug and grocery stores are safe because they do not require a prescription to purchase. This is the myth. The simple truth: ANY drug, whether over-thecounter or prescription, is potentially dangerous if misused. All drugs have potential side effects. This is a common feature of both prescription and OTC drugs.

So what is the difference? The main difference goes back to what we have already learned about the Drug Enforcement Administration (DEA) controlled substance schedules for classifying



drugs. The federal Controlled Substances Act (CSA) defines regulations for different drugs' manufacture, importing, possession, use and distribution. In some cases, the major difference in classifying a substance as needing a prescription versus being accessible as an

OTC medication lies in the concentration of active ingredients the substance contains. Thus, when taken as directed, there is little risk involved. That does not mean there is NO risk, only that the risk level is in a tolerable range for the general population. The risks, however, are much more difficult to judge for:

- Children
- Adolescents
- Individuals with certain types of physical conditions (including pregnancy)
- Individuals with a pre-existing substance use disorder

Therefore, what is true about the myth is that the DEA believes the OTC drugs to have low potential for abuse compared to drugs that become scheduled.

What Is OTC Misuse About?

You learned about the classes of sedativehypnotic and CNS depressant drugs (Module 9), stimulant drugs (Module 10), and opioid and



narcotic drugs (Module 11). In those modules, you learned a great deal about the epidemiology of who misuses the prescription forms of these substances. In the mainstream media, you hear a lot about the problem of prescription abuse, and these generally are the drugs they are talking about.

OTC abuse is not loom as large on the public's radar, however. There are three types of OTC drugs for us to consider in greater detail.

Decongestants. Until relatively recently, pseudoephedrine was easily purchased as an OTC for managing cold, flu, and allergy symptoms of nasal congestion. Since 2005, it has become more tightly controlled. Although these medication are still available without a prescription, they are no longer simple OTC products in the United States. Their status is as a behind-the-counter (BTC) medication in some

countries. In the United States, we have a limited version of BTC policy. This means that a person can purchase the substance without a prescription, but only through interacting with a pharmacist and in small amounts. The reason: pseudoephedrine can be used as an ingredient in the illegal manufacturing of methamphetamine. Medications containing pseudoephedrine may be abused on their own for other purposes: weight loss or as a stimulating performance enhancer (see the weight losss drugs discussion below, for example).

Cough Medicines. Dextromethorphan (DXM) is an ingredient commonly found in many OTC products intended a cough suppressant. At as recommended doses. DXM works on the part of the brain region that controls coughing. However, at extremely high doses (10-50)times the recommended), it becomes a psychotropic drug, potentially euphoria causing or hallucinations (sometimes



referred to as "robotripping" or "skittling"-see NIDA, 2014). The effect is as a dissociative hallucinogen, like with PCP or ketamine. Thus, it may not be for the alcohol content in cough medicine that people abuse

these products (many forms are alcohol free nowadays, including tablets and capsules), instead it is about the DXM. Abuse of DXM is largely a young person's behavior. One reason is that DXM is legal, easily accessible, and relatively inexpensive. Another is the perception of safety related to the myth we discussed above. And, it may be easier to hide from parents who are unaware that it represents a form of substance misuse.

One hazard related to DXM misuse is the potential for acquiring it from outside of the United States in a very highly concentrated form meant for pharmacies to use in formulating controlled doses; this "raw" or "pure" form may easily be taken in much higher doses than intended. The risks include impaired judgment and mental function (thus, impaired driving and bad decisions about risky behaviors), irregular/rapid heart rate, increased blood pressure (thus, stroke risk increases), vomiting (thus, risk of aspiration/choking), and coma/death.

Another hazard lies in taking DXM along with other substances. Furthermore, many of the formulations that contain DXM also have other medications in combination. For example, OTC cold/flu medications often contain acetaminophen, which can cause liver damage, heart attack, or stroke in overdose amounts. These formulations also may contain antihistamines and other substances intended to relieve cold/flu symptoms and that are dangerous at high doses. If a person is taking enough of the combination medications to "get high," there may be enough of these other substances to cause irreversible or deadly damage.

Some prescription cough medicines include codeine or its closely related cousins. These medications may be abused by individuals because codeine shares the same receptor sites as opioids and heroin (remember our neurotransmitters discussions). These are potentially addictive medications because of their impact on the increased dopamine released in the brain's reward system.

Weight Loss

Aids. You learned about a variety of types of stimulant substances in Module 10, including



amphetamines, cocaine, tobacco, and caffeine. One reason for misuse of stimulant drugs relates to their tendency to suppress appetite. In turn, this can contribute to weight loss. In the past, many individuals were prescribed stimulant drugs to achieve a weight loss goal. However, this practice has diminished markedly as a result of recognizing the high addictive potential associated with many of the stimulant prescription drugs. There are a wide range of OTC stimulant products on the market, with questionable levels of risk and benefit. Until recently banned, products sold in the United States might have included ingredients like ephedrine and ephedra or phenylpropanolamine. The pseudoephedrine discussed above as an ingredient in methamphetamine may be abused for weight loss purposes, as well. Ingredients like bitter orange and ma huang (acting like ephedra) can cause nervousness, tremor, rapid/irregular heart rate, increased blood pressure, and stroke, as well as being potentially addictive (Cohen, 2013).

Relatively recently, a new approach to serious weight loss medication has emerged: prescription medications that influence the brain chemistry of appetite and craving (thus helping reduce caloric intake) without the stimulant effects on heart rate and blood pressure. They largely operate on the serotonin neurotransmitter systems of the brain. These are prescription medications because of their potential risks.

Addressing Prescription Drug Abuse

In earlier modules you learned about the problem of prescription drug abuse. Here is a sobering statistic that we have not yet addressed: the number of deaths



nationally from opioid drugs alone (not all drugs) during 2015 was almost 35,000-very close to the 35,092 people who died in motor vehicle crashes (IIHS, 2016; NIDA, 2017). About 16,000 of these deaths involved prescription opioids and nearly 20,000 involved heroin

or other non-methadone synthetics like illicit use of fentanyl (NIDA, 2017).

What can be done to address the problem? The United Stated Department of Health and Human Services (HHS) produced a report containing a list of recommendations for addressing the massive problem of prescription abuse in the United States.

Here is a copy of their summarized findings (CDC, 2013):

As described in this report, current HHS prescription drug abuse activities fall within the following eight domains: 1) surveillance, 2) drug abuse prevention, 3) patient and public education, 4) provider education, 5) clinical practice tools, 6) regulatory and oversight activities, 7) drug abuse treatment, and 8) overdose prevention. Each of these areas contributes to ensuring the safe use of prescription drugs and the treatment of prescription drug dependence. Although significant efforts are already underway, a review of current activities along with a review of the prescription drug abuse literature, identified enhance opportunities to policy and programmatic efforts as well as future research Below are the overarching are presented. to enhance current opportunities activities identified in this report.

Strengthen surveillance systems and capacity

Build the evidence-base for prescription drug abuse prevention programs

Enhance coordination of patient, public, and provider education programs among federal agencies

Further develop targeted patient, public, and provider education programs

Support efforts to increase provider use of prescription drug monitoring programs (PDMPs)

Leverage health information technology to improve clinical care and reduce abuse

Synthesize pain management guideline recommendations and incorporate into clinical decision support tools

Collaborate with insurers and pharmacy benefit managers to implement robust claims review programs

Collaborate with insurers, and pharmacy benefit managers to identify and implement programs that improve oversight of high-risk prescribing.

Improve analytic tools for regulatory and oversight purposes

Continue efforts to integrate drug abuse treatment and primary care

Expand efforts to increase access to medication-assisted treatment

Expand Screening, Brief Intervention, and Referral to Treatment services

Prevent opioid overdose through new formulations of naloxone

Described more fully in Section III of the report, the opportunities listed above serve to strengthen programs and policies to reduce prescription drug abuse and overdose in the U.S. HHS has been at the forefront of the response to this serious public health issue and is committed to working with our federal, state, local governmental and nongovernmental partners to further the actions included in this report.

You can see from this report that there is no one single, simple solution or strategy that will solve the problem. The complex nature of the issues involved dictates applying complex, integrated approaches.



Considering this information about Over-the-Counter drugs, what do you think about the need for

government bodies to have authority over these substances the way there is currently authority over prescription drugs? Which bodies should this be? On the other hand, how much discretion should manufacturers have over the claims they make about their OTC products and what should be their level of responsibility for consumer safety in using these products? What kinds of criteria should apply? The range could be anywhere from "buyer beware" to imposing strict controls.

Ch. 2: Pharmacotherapy

This chapter explores the use of medications in the treatment of substance use disorders. There are two for general labels this kind of strategy: pharmacotherapy or medication assisted treatment (MAT). At this point, you will read a piece by Miller, (2011) Forcehimes. and Zweben entitled "Pharmacological adjuncts" from the book they published called Treating addiction: A guide for professionals.

In this chapter you will read about:

- Medications for drug withdrawal and maintenance (nicotine substitution, methadone, buprenorphine, naltrexone, disulfiram, acamprosate, topirimate)
- Combining medication with behavioral interventions
- Key terms related to pharmacotherapy.



As you read the chapter contents, consider several things. First, on the surface, it might seem a bit paradoxical to treat a drug problem with drugs. The strategy is not without particularly among practitioners who

controversy, particularly a

368 | Theories and Biological Basis of Addiction

themselves have managed to overcome a substance use medication. Underlying disorder without many programs is a philosophy of total abstinence from all substances, types of psychotropic including medications prescribed in pharmacotherapy. However, growing) literature (and there exists а sizable supporting the use of certain medications to facilitate treatment of substance use disorders. The underlying assumption is that substance use disorders and addiction are diseases of the brain and brain chemistry, therefore attacking those brain chemistry mechanisms is a reasonable approach to treatment.

Second, it is important to note that the evidence combining psychological, supports social, and biological approaches in combination-medications alone are not sufficient. Above, you read the phrase "supporting the use of certain medications to facilitate treatment." In other words, medication alone is not sufficient treatment, which is why the concept of medication assisted treatment (MAT) is so important. This is the theme of the guidelines published by the Abuse and Mental Health Substance Services Administration (SAMHSA, 2016) for medication assisted addiction. treatment of opioid These guidelines indicate that the following steps are critical:

- Evaluate the need for medically managed withdrawal from the opioids (remember this topic was covered in Module 11).
- Addressing co-occurring problems (more about

this in Module 14)

• Integrate pharmacologic and nonpharmacologic therapies-medications are a part of a comprehensive, individualized treatment plan that includes counseling and other psychosocial therapies and mutual-help programs.

This should remind you of our class emphasis on the biopsychosocial perspective on substance misuse and substance use disorders.



Third, the medications used to treat substance use disorders are not without side effects and risks themselves. This includes the fact that some treatment medications have addictive potential themselves (e.g., methadone). The hope is that these known risks can be managed more safely than occurs in the uncontrolled world of substance misuse, especially illicit substances, "street" drugs, drugs imported from other countries, and illicit use of prescription drugs.

In short, keep in mind that MAT, or pharmacotherapy,

is a tool in the collection of options available for the treatment of substance use disorders. As we have learned throughout this course, no one-size-fits-all approach works for everyone. Treatment programs need to be tailored to individuals and their circumstances, and often need to be modified as a person's circumstances change over time.



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Ch. 3: Detoxification and Stabilization

One place where addiction treatment might be supported with medication is in the immediate *detoxification process* (*detox*). Detox is considered a *stabilization process*. You are going to be reading segment excerpted from a Treatment Improvement Protocol (TIP #45) produced by the Substance Abuse and Mental Health Services Administration (SAMHSA, 2015), titled Detoxification and Substance Abuse Treatment. You will read about:

- Detox as part of a continuum of care
- The goals of the detox process
- Features of withdrawal associated with 4 specific types of substances

Keep in mind that you are reading only 6 pages of a 257 page manual. One thing that might be a bit confusing if you are not used to the jargon is the levels of care in the detox protocol. They are listed in your reading from least to most intensive: Level I being "ambulatory" to Level IV being intensive inpatient care.

The other thing that it is very important to keep in mind as you read this material is that detox or stabilization is part of a continuum of care to treat individuals experiencing a substance use disorder or addiction. A stabilization program may consist of specific stages or phases with different aims at each point in the process.

- First, the goal is to monitor the acute medical situation or crisis, ensuring safety as the misused substances leave the body (withdrawal).
 Administering medications to support the person medically could take place during this phase, but only if the medical team knows what drugs the person has taken-a polydrug use crisis might leave the team unwilling to risk administering medications. The initial detox stabilization phase might last a matter of hours.
- 2. The second phase of stabilization involves a more extended detoxification treatment plan (measured in days) to manage the next phase of the early withdrawal period and to support the person in obtaining ongoing treatment for the substance use disorder. This might involve starting a medication assisted treatment (MAT) plan.
- 3. The next phase of a stabilization plan might continue for days to weeks with the goal of making a successful transition to long-term treatment, often involving counseling, supportive "recovery" housing, and MAT.

Finally, in this chapter you are asked to read a brief news article about the recent death of another star: Nelsan Ellis. This news article has us considering what might happen to a person who abruptly stops taking a substance like alcohol to which an addiction has developed. Abrupt cessation does not cause death from acute withdrawal for all substances, but death could be a result when the addiction involves alcohol or barbiturates. (article retrieved from Washington Post is Nelsan Ellis died of alcohol withdrawal. Family hopes his death will be a 'cautionary tale.')



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Ch. 4: Policy Considerations

The final reading for Module 13 brings us back fullcircle to our Module 1 content about policy approaches for addressing substance misuse and addiction. You will be reading a brief opinion piece related to the implications for developing humane policy responses that come from what you have learned this semester about the biopsychosocial aspects of substance misuse and addiction. We are reading it in Module 13 because it places detox in context, but also because it serves as a chance for us to look back and begin synthesizing the complicated content studied in this course (more of that in Module 14). The reading is Humphreys, K., Malenka, R.C., Knutson, B., & MacCoun, R.J. (2017). Policy forum: Neuroscience and addiction-Brains, environments, and policy responses to addiction. Science, 356, 1237-1239.

In this brief article, you will read about:

- The role of neuroscience in shaping policy about substance use and addiction
- The role of environment in the course of addiction
- Several policy response ideas from other nations.



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What do you think about this author's stance about allowing "free market" principles to operate with

regard to psychoactive substances like alcohol, tobacco and other drugs? Where do YOU think the evidence leads with regards to such policy positions?

Ch. 5: Summary

In this Module 13 online coursebook, you learned basic principles about prescription and over-thecounter drug misuse, pharmacotherapy as an intervention approach, and the early treatment phase called detox or stabilization. We explored some of the most commonly misused OTC substances and looked into recommendations for crafting a response to the problem of prescription drug abuse. Then we were introduced to the principles of pharmacotherapy and medication assisted treatment (MAT), learning about some of the specific medications used for this purpose. The next topic we explored was detox and stabilization as part of a continuum of care for treating individuals who experience a substance use disorder, and how medication might be a part of the various phases of the stabilization process. At this point, we also looked at some of the characteristics of withdrawal from four types of substances: cocaine, alcohol, heroin. and marijuana. We looked at a brief news article, as well, that made real what might happen if a person abruptly stops taking certain substances to which the body has developed an addiction. Finally, we briefly started looking back over our entire course and considered how the biopsychosocial aspects of substance misuse and addiction might relate to developing policy responses. This will carry us into some of our learning activities for the next and final module in our course, Module 14.

You are now ready to review some of the key terms related to substance use disorders introduced in this book.

Module 13: Key Terms

- **behind-the-counter drugs (BTCs)**: medications available for purchase without a prescription but requiring interaction with a pharmacist to access; policy for specific substances in some countries.
- **detoxification process (detox)**: an initial step in the treatment process where psychotropic substances (toxins) are safely removed from the body, minimize difficulty in withdrawal (stabilization), and support a transition to longterm treatment and recovery from addiction.
- **dextromethorphan (DXM)**: an active ingredient in many over-the-counter medications; may be abused as a psychotropic substance in extremely high doses.
- **medication assisted treatment (MAT)**: a combination of medications and behavioral therapy to treat a person's substance use disorder.
- **over-the-counter drugs (OTCs)**: medications available for purchase without a prescription.
- **pharmacotherapy**: therapy involving the administration of pharmaceutical drugs.
- **prescription drugs**: substances/medications requiring a prescription produced by a licensed medical provider in order to legally purchase.
- stabilization process: the process of safely removing

abused substances from the human body; see detoxification.

Ch. 13: References

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MODULE 14: CO-OCCURRING PROBLEMS

Theories and Biological Basis of Addiction | 387

Module 14: Introduction

The reading for Module 14 introduces concepts essential for understanding some of the problems that co-occur with substance use, substance misuse, and substance use disorders. These readings also address a few additional final points about our course topic. This online coursebook includes content prepared by the book's author, as well as several readings from the published literature.

Module 14 Reading Objectives

After engaging with these reading materials and learning resources, you should be able to:

- Explain the relationships between substance misuse/substance use disorders and several mental health, physical health, behavioral health, and social problems that often co-occur
- Identify how co-occurring problems interact to affect outcomes
- Identify ways to become aware of co-occurring problems and to modify intervention strategies to be more responsive

• Define several key terms related to co-occurring problems in the field of substance use, substance misuse, and substance use disorders.
Ch. 1: What Are Co-Occurring Problems?

The first reading for Module 14 provides you with an overview of what we are talking about in terms of cooccuring problems: specifically, problems that often co-occur with substance use, substance misuse, and substance use disorders. While this content emphasizes mental disorders and disability, remember that there are many other types of problems that may co-occur with substance misuse, as well. These include:

- Incarceration, involvement with the criminal justice system, and legal problems
- Exposure to, witnessing, or perpetrating violence and other forms of exploitation (physical, sexual, emotional, intimate partner, community violence, as well as child maltreatment)
- Housing instability or homelessness
- Unemployment, underemployment, and worker exploitation (including sex trafficking)
- Physical health problems that are both acute and chronic or have long-term consequences (infectious disease exposure, infections, reduced resistance, lack of preventive health or prenatal

care, malnutrition, injury, death)

- Compromised mental health (mental disorders, stress, anxiety, depression, suicide risk)
- Behavioral addictions (gambling, for example)

The first reading comes from a textbook about addiction; we will not be reading the entire piece, only an excerpt from: vanWormer, K., & Davis, D.R. (2013). Substance misuse with a co-occurring mental disorder or disability. In Addiction treatment: A strengths perspective, third edition (pp. 452-474). Belmont, CA: Brooks/Cole.

In this first chapter you will read about:

- mental health conditions, stress, and other disorders (gambling, eating disorders, personality disorders, mood and thought disorders)
- a case example related to one veteran's experience (which relates to Chapter 3)
- integrated treatment models, and
- key terms used in the field of substance use disorders and addiction.



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Ch. 2: Comorbidity with Addiction

Our second chapter for Module 14 is about *comorbidity* and comes from the National Institute on Drug Abuse (NIDA; 2010) research report, Comorbidity: Addiction and Other Mental Illness. This is where that distinction made in Chapter 1 comes into play: it addresses cooccurring diagnosable conditions, not many of the other kinds of personal, family, or community problems that co-occur with substance use. The concepts presented in this piece are relevant, although some of the statistics have shifted a bit. These are more upto-date in the material you read in Chapter 1. Another point to consider as you read this chapter: the authors define co-morbidity as two disorders that co-occur. However, this should probably read "two or more" because individuals may experience more than two at a time.

In this chapter, you will read about:

- childhood ADHD and later drug problems
- the overlap between smoking and schizophrenia
- how common over-lapping conditions are
- why substance use disorders so commonly cooccur with other mental disorders (especially the brain-related reasons)

- issues in diagnosis and treatment of comorbid conditions
- exposure to traumatic events and the risk of substance use disorders



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Ch. 3: More About Post-traumatic Stress Disorder (PTSD)

This chapter introduces information about a population that we have not previously discussed in any specific way: the population of combat veterans. Although what we have discussed throughout the course applies to all types of individuals experiencing problems with substance misuse and substance use disorders. professionals are increasingly learning about some of the exceptional circumstances experienced by men and women who are combat veterans. Many, though by no means all, experience post-traumatic stress symptoms. Many experiences other than having been engaged in military combat also can lead to post-traumatic stress (e.g., being the victim of or witness to physical, sexual, or emotional forms of violence).

While **post-traumatic stress disorder (PTSD)** has very specific diagnostic criteria, individuals may experience a complex of post-traumatic stress **symptoms** without necessarily meeting the criteria for a **diagnosis** of PTSD. We do know that post-traumatic stress is highly prevalent in the personal histories of many individuals who use and misuse substances. The article that you will be reading for this chapter looks at alcohol misuse

and two factors that might influence alcohol use disorders (AUDs) among combat veterans: (1) the use of alcohol as a coping strategy and (2) stigma around seeking help for post-traumatic stress symptoms. The most important sections to pay attention to include the introduction (all of section 1), Figure 1 (p. 92), and the discussion (all of section 4). The article you will be reading is: Miller, S.M., Pedersen, E.R., & Marshall, G.N. (2017). Combat experience and problem drinking in veterans: Exploring the role of PTSD, coping motives, and perceived stigma. Addictive Behaviors, 66, 90–95.

One other thing to keep in mind as you review this article: way back in the earliest modules of our course, we spent time thinking about the problem of casually using words like "addict" and "addicted." It is equally important to address the overly casual use of the term "PTSD" that has crept into general conversation in our society. Like substance use disorders, PTSD is a very real (biopsychosocial) disorder with debilitating symptoms that can be effectively treated if properly diagnosed and managed.

In this chapter you will read about:

- the nature of PTSD
- the co-occurrence of alcohol use disorders and PTSD among combat veterans, and
- key terms used in the fields of substance use disorders and veterans' health.



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• What does the study conclusion about these

Theories and Biological Basis of Addiction | 399

young adult veterans possibly tell you about the relationship between PTSD symptoms and "drinking to cope" by people who have experienced trauma outside of combat?

- What do the study conclusions about these young adult veterans also possibly indicate about the impact of perceived stigma about seeking help for alcohol (or other substance) problems?
- What do you think are some other situations that might lead to a person have a trauma response like what was reported among these young adult veterans?
- What did you learn about "the language that we use" related to addiction that might also apply to language about PTSD?

Ch. 4: Summary

In this Module 14 online coursebook, you learned basic principles about problems that might cooccur with substance use, substance misuse, and substance use disorders. We explored some of the mental health disorders, as well as introducing some of the physical health and social/behavioral problems that may co-occur. We placed some emphasis on the co-occurring problem of posttraumatic stress symptoms and PTSD. Your readings also offered suggestions related to the importance of offering integrated care for addressing co-occurring problems and disorders.

You are now ready to review some of the key terms related to substance use disorders that were introduced in this final book.

Module 14: Key Terms

- **Co-morbidity**: two or more diagnosable disorders occurring at about the same time in a person's life.
- **Co-occurring problems**: physical health, mental/ behavioral health, or social problems that occur at about the same time. This includes co-morbid conditions as well as a host of other possible challenges that are not diagnosable disorders.
- Post-Traumatic Stress Disorder (PTSD): a diagnosable condition characterized by а complex constellation of symptoms following exposure to one or more traumatizing events. Note that post-trauma symptoms after may appear significant time lapses and may appear intermittently, as well.

Module 14: References

- Miller, S.M., Pedersen, E.R., & Marshall, G.N. (2017). Combat experience and problem drinking in veterans: Exploring the role of PTSD, coping motives, and perceived stigma. Addictive Behaviors, 66, 90-95.
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