

FOUNDATIONS OF ADDICTION STUDIES



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Foundations of Addiction Studies (Florin and Trytek)

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About this Book

Addiction is a concept that has been around for hundreds of years, but we still struggle to define and understand the word. When the American Psychiatric Association (APA) released a new diagnostic manual (DSM-5) in 2013, they incorporated the term addiction, which did not appear in previous versions of the influential text. However, the APA also acknowledged that the term can be stigmatizing and that its definition is uncertain. As we move into the next era of understanding about addiction, we need to continue refining our knowledge of this deadly disease.

In this book, we want to bring to life the core concepts at the heart of addiction. You may have friends or family members struggling with an addiction, or you yourself may have problems with addiction. You might be interested in working to help people in recovery, or you are simply curious to know more about this issue. Whatever the case, this book will introduce key terminology and research help you define, discuss, diagnose, and deal with this problem.

The material is organized so that each chapter focuses on a different theme related to addiction. Within each chapter are multiple sub-parts where you will find an introductory reading, a video, an article, an activity, questions for discussion, and a short quiz. Some sections also include slide presentations for you to view.

We encourage you to take each section in order, as information in the early chapters will be useful to better understand later chapters:

- Chapter One: *What is Addiction?*
- Chapter Two: *Why Do People Use?*
- Chapter Three: *An Overview of Pharmacology*
- Chapter Four: *Special Considerations*
- Chapter Five: *Adolescents and Addiction*
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- Chapter Seven: *Biopsychosocial Issues*
- Chapter Eight: *Assessment & Treatment*
- Chapter Nine: *Pathways to Recovery*

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Special thanks to our colleagues and mentors at College of DuPage for helping to make this project a reality: Brian Caputo, Denise Cote, Karin Evans, Lara Tompkins, Mark Curtis-Chavez, Marianne Hunnicutt, and Andrea Polites.

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CHAPTER OVERVIEW

1: Chapters

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1.1: What is Addiction?

Part One: The Three C's

For thousands of years, human cultures have used psychoactive substances for various purposes, including religious ceremonies, medicinal healing, to experience altered mind states, and for the pure pleasure it can produce.

In popular American culture, drug use is often glamorized – or even dramatized – as a way of providing maximum effect in television shows, films, and books. These stories shape our expectancies about what drugs will do to us (or for us) and how we understand the issue of addiction. Unfortunately, these portrayals do little to clarify the confusion about addiction, and they may worsen the stigma.

Going into this book, we ask you to keep an open mind. It is tempting to see addiction through the lens of our own experiences, and that is natural to do. However, many voices contribute to the concept of addiction, and they deserve to be heard as well. Because addiction is a complicated process, our understanding of it often requires us to challenge our existing views.



Below are some questions people often ask about addiction, which can aid your exploration of the topics in this book and help us seek answers:

Common Questions About Addiction

How do you distinguish between addiction and other types of drug use?

Why can't an addicted person just stop using?

Can a person be addicted to anything?

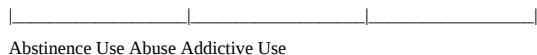
Is everyone addicted to something?

Is addiction always a bad thing / Can you have a good addiction?

Can addiction be successfully treated?

While discussions about addiction have changed and will continue to evolve, one thing we know is that the core of addiction is the brain. Stated simply, “anyone with a brain can become an addict” (Kuhn, Swartzwelder, & Wilson, 2019). Certain people are more likely to develop an addiction, and people who are not necessarily addicted can still have significant problems with drugs of abuse. And relatively speaking, our understanding of the brain is in its infancy, particularly when it comes to mental health, compulsive behavior, and addiction.

Let's start by looking at drug use on a continuum. On one end, we have *abstinence* or no use. Next to that we have *use*, followed by *abuse*, and finally *addictive use*.



A person who is not using a certain drug will not have problems with it; that's fairly simple to understand. This may include someone who never wanted to try a certain drug, who does not have access to it, or who previously used it but no longer does.

From there, we can look at use. This involves trying any particular drug, such as marijuana, alcohol, or cocaine. Notably, this can also include prescribed medication. Drug use can become habitual and problematic, but it does not always. Some people experiment with a drug and never use it again, or they use it infrequently and moderately enough that it does not interfere with their life. However, we should note that some users do not perceive the damage that has been caused by their drug use and fail to identify the consequences.

A more serious step would be drug abuse, and at this stage, the user has experienced problems related to their use. They are using more of the drug than intended or have engaged in problematic behavior while using or getting the drug. This could occur after just a single use of a drug, particularly if someone is unfamiliar with the effects of the drug. Think of a young person taking several shots of alcohol for the first time in their life and then trying to drive afterward. This could lead to catastrophic consequences.

Chronic use of a drug may also fall under the category of abuse, provided that it doesn't meet the definition of addictive use. Note that there is no longer a diagnostic category called “abuse” in the newest version of the Diagnostic and Statistical Manual (DSM). Instead, there is simply the term Substance Use Disorder, and qualifiers to define the level of severity: Mild, Moderate, or Severe.

Finally, we have addictive use. An easy way to identify addictive use is by remembering the three Cs: **Compulsion**, **Loss of Control**, & **Consequences**. When a person's use has all of these characteristics, it is an addiction. This also fits well with the definition written by the American Society of Addiction Medicine (ASAM), which can be found later in this chapter.

Let's explain each of the three Cs a bit further:

Compulsion – this is an overwhelming urge to use the drug; an obsession is a repetitive and disruptive thought, and compulsion represents the behavior to act on the thought (as in obsessive-compulsive disorder)

Loss of Control – occurs when the person can no longer predict how much they will use and what will happen when they do use

Consequences – characterized by a person continuing to use despite consequences related to their use, such as financial, legal, social, interpersonal, emotional and spiritual (what we call the six “ALS”)

Examples of the Three Cs

Compulsion: A woman experiences intense urges to use cocaine while at work and leaves her desk to get high in the bathroom.

Loss of Control: A college student intends to have one drink with a friend before going back to his room to study. He ends up having eight drinks throughout the night and staying until the bar closes.

Consequences: A woman has been arrested and convicted three times for driving under the influence, yet she continues to drink and drive while denying that she has a problem.

There is a significant discussion around the role of choice in addiction. One way to think of it is that addiction involves choices, but addiction itself is not a choice. As with other diseases and disorders, individual choice plays a role, as do genetics, home environment, and cultural norms. Addiction is a complex disorder because it involves perhaps the most complex entity in the universe, namely the human brain.

Some people are uncomfortable with the disease concept of addiction because they believe it removes responsibility from the using person. However, addictions specialists use the disease concept to remove the burden and guilt associated with the consequences of addictive use, while empowering the individual to take healthy steps toward recovery. While other models may emerge in the future to describe addictive use, the brain disease model holds several advantages.

For one, it is destigmatizing and takes away blame. It also suggests an important role for treatment, whether that be through the use of medications, formal therapy, support groups, or other positive lifestyle changes. And finally, the disease concept opens up the need for further research to better understand the illness and develop improved ways of recovering from it.

It is crucial that a person identifies a problem and takes responsibility for their recovery. However, no benefit has been found from forcing people to accept a certain label, like the terms “addict” and “alcoholic.” Because of the long-standing stigma in the fields of addiction and mental health, people struggling with these issues often minimize or hide their problems and refuse to seek help. Therefore, it is vital to make treatment and recovery accessible to all without putting unnecessary barriers in the way.

As you explore this chapter, you will learn to define addiction, recognize its impact on society, compare United States drug-using norms to those of other countries, and identify addiction as a dysfunctional relationship between user and substance.

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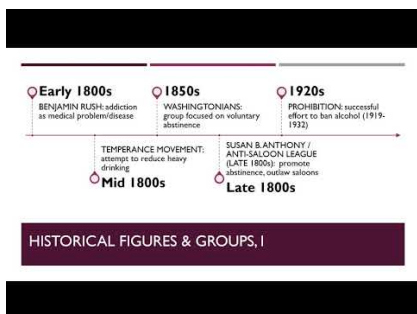
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Video



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Slides



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Article: ASAM Definition of Addiction Offers Support for Long Term Treatment and Recovery Approaches

by David Kerr

The American Society of Addiction Medicine (ASAM) has recently created a definition of addiction. The essential long-term treatment and recovery needs of the addict are supported by this recent ASAM definition.

The definition of addiction offered by ASAM is as follows:

Addiction is a primary, chronic disease of brain reward, motivation, memory and related circuitry. Dysfunction in these circuits leads to characteristic biological, psychological, social and spiritual manifestations. This is reflected in an individual pathologically pursuing reward and/or relief by substance use and other behaviors.

Addiction is characterized by inability to consistently abstain, impairment in behavioral control, and craving, diminished recognition of significant problems with one’s behaviors and interpersonal relationships, and a dysfunctional emotional response. Like other chronic diseases, addiction often involves cycles of relapse and remission. Without treatment or engagement in recovery activities, addiction is progressive and can result in disability or premature death.

This definition describes physical attributes that appear to relate to the very wiring of the human brain. After reading both the short and long term definitions recently published by ASAM, it is clear to me why addicts have such a difficult time stopping their drug and/or alcohol use. It is equally clear why relapse may be frequent. The brain of a substance abuser is hard-wired for addiction and if changes are to occur to reverse this, the re-wiring will likely take a long time. Knowing this, it is easy to see why long term treatment and recovery approaches appear to be more durable than the short-term acute care approaches.

A logical assumption can be made that it took years to wire the addictive brain chemistry and any approach to restore normalcy in this chemistry or to re-wire the brain will also probably take years. This is why the Alcoholics Anonymous (AA) approach has had success and is why long-term treatment, recovery, and supportive care are likely to be more durable.

How Addiction Hijacks the Brain

Published by Harvard Health Publishing, Harvard Medical School

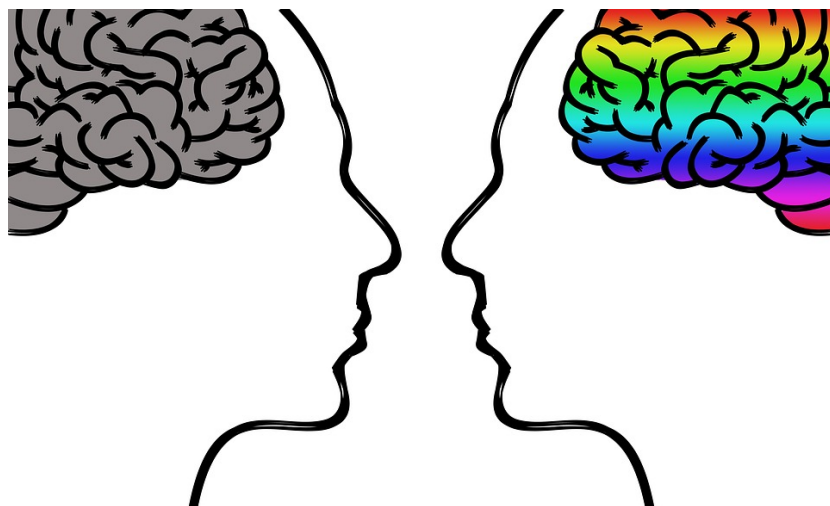


Image courtesy Pixabay

Desire initiates the process, but learning sustains it.

The word “addiction” is derived from a Latin term for “enslaved by” or “bound to.” Anyone who has struggled to overcome an addiction — or has tried to help someone else to do so — understands why.

Addiction exerts a long and powerful influence on the brain that manifests in three distinct ways: craving for the object of addiction, loss of control over its use, and continuing involvement with it despite adverse consequences. While overcoming addiction is possible, the process is often long, slow, and complicated. It took years for researchers and policymakers to arrive at this understanding.

In the 1930s, when researchers first began to investigate what caused addictive behavior, they believed that people who developed addictions were somehow morally flawed or lacking in willpower. Overcoming addiction, they thought, involved punishing miscreants or, alternately, encouraging them to muster the will to break a habit.

The scientific consensus has changed since then. Today we recognize addiction as a chronic disease that changes both brain structure and function. Just as cardiovascular disease damages the heart and diabetes impairs the pancreas, addiction hijacks the brain. Recovery from addiction involves willpower, certainly, but it is not enough to “just say no” — as the 1980s slogan suggested. Instead, people typically use multiple strategies — including psychotherapy, medication, and self-care — as they try to break the grip of an addiction.

Another shift in thinking about addiction has occurred as well. For many years, experts believed that only alcohol and powerful drugs could cause addiction. Neuroimaging technologies and more recent research, however, have shown that certain pleasurable activities, such as gambling, shopping, and sex, can also co-opt the brain. Although the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* describes multiple addictions, each tied to a specific substance or activity, consensus is emerging that these may represent multiple expressions of a common underlying brain process.

From liking to wanting

Nobody starts out intending to develop an addiction, but many people get caught in its snare. According to the latest government statistics, nearly 23 million Americans — almost one in 10 — are addicted to alcohol or other drugs. More than two-thirds of people with addiction abuse alcohol. The top three drugs causing addiction are marijuana, opioid (narcotic) pain relievers, and cocaine.

Genetic vulnerability contributes to the risk of developing an addiction. Twin and adoption studies show that about 40% to 60% of susceptibility to addiction is hereditary. But behavior plays a key role, especially when it comes to reinforcing a habit.

Pleasure principle. The brain registers all pleasures in the same way, whether they originate with a psychoactive drug, a monetary reward, a sexual encounter, or a satisfying meal. In the brain, pleasure has a distinct signature: the release of the neurotransmitter dopamine in the nucleus accumbens, a cluster of nerve cells lying underneath the cerebral cortex (see illustration). Dopamine release in the nucleus accumbens is so consistently tied with pleasure that neuroscientists refer to the region as the brain’s pleasure center.

The brain’s reward center

Addictive drugs provide a shortcut to the brain’s reward system by flooding the nucleus accumbens with dopamine. The hippocampus lays down memories of this rapid sense of satisfaction, and the amygdala creates a conditioned response to certain stimuli.

All drugs of abuse, from nicotine to heroin, cause a particularly powerful surge of dopamine in the nucleus accumbens. The likelihood that the use of a drug or participation in a rewarding activity will lead to addiction is directly linked to the speed with which it promotes dopamine release, the intensity of that release, and the reliability of that release. Even taking the same drug through different methods of administration can influence how likely it is to lead to addiction. Smoking a drug or injecting it intravenously, as opposed to swallowing it as a pill, for example, generally produces a faster, stronger dopamine signal and is more likely to lead to drug misuse.

Learning process. Scientists once believed that the experience of pleasure alone was enough to prompt people to continue seeking an addictive substance or activity. But more recent research suggests that the situation is more complicated. Dopamine not only contributes to the experience of pleasure, but also plays a role in learning and memory — two key elements in the transition from liking something to becoming addicted to it.

According to the current theory about addiction, dopamine interacts with another neurotransmitter, glutamate, to take over the brain’s system of reward-related learning. This system has an important role in sustaining life because it links activities needed for human survival (such as eating and sex) with pleasure and reward. The reward circuit in the brain includes areas involved with motivation and memory as well as with pleasure. Addictive substances and behaviors stimulate the same circuit — and then overload it.

Repeated exposure to an addictive substance or behavior causes nerve cells in the nucleus accumbens and the prefrontal cortex (the area of the brain involved in planning and executing tasks) to communicate in a way that couples *liking* something with *wanting* it, in turn driving us to go after it. That is, this process motivates us to take action to seek out the source of

pleasure.

Tolerance and compulsion. Over time, the brain adapts in a way that actually makes the sought-after substance or activity less pleasurable.

In nature, rewards usually come only with time and effort. Addictive drugs and behaviors provide a shortcut, flooding the brain with dopamine and other neurotransmitters. Our brains do not have an easy way to withstand the onslaught.

Addictive drugs, for example, can release two to 10 times the amount of dopamine that natural rewards do, and they do it more quickly and more reliably. In a person who becomes addicted, brain receptors become overwhelmed. The brain responds by producing less dopamine or eliminating dopamine receptors — an adaptation similar to turning the volume down on a loudspeaker when noise becomes too loud.

As a result of these adaptations, dopamine has less impact on the brain's reward center. People who develop an addiction typically find that, in time, the desired substance no longer gives them as much pleasure. They have to take more of it to obtain the same dopamine “high” because their brains have adapted — an effect known as tolerance.

At this point, compulsion takes over. The pleasure associated with an addictive drug or behavior subsides — and yet the memory of the desired effect and the need to recreate it (the *wanting*) persists. It's as though the normal machinery of motivation is no longer functioning.

The learning process mentioned earlier also comes into play. The hippocampus and the amygdala store information about environmental cues associated with the desired substance, so that it can be located again. These memories help create a conditioned response — intense craving — whenever the person encounters those environmental cues.

Cravings contribute not only to addiction but to relapse after a hard-won sobriety. A person addicted to heroin may be in danger of relapse when he sees a hypodermic needle, for example, while another person might start to drink again after seeing a bottle of whiskey. Conditioned learning helps explain why people who develop an addiction risk relapse even after years of abstinence.

The long road to recovery

Because addiction is learned and stored in the brain as memory, recovery is a slow and hesitant process in which the influence of those memories diminishes.

About 40% to 60% of people with a drug addiction experience at least one relapse after an initial recovery. While this may seem discouraging, the relapse rate is similar to that in other chronic diseases, such as high blood pressure and asthma, where 50% to 70% of people each year experience a recurrence of symptoms significant enough to require medical intervention.

Key Takeaway

Relapse rates from drug addiction are comparable to many other chronic illnesses, such as hypertension and asthma.

Fortunately, a number of effective treatments exist for addiction, usually combining self-help strategies, psychotherapy, and rehabilitation. For some types of addictions, medication may also help.

The precise plan varies based on the nature of the addiction, but all treatments are aimed at helping people to unlearn their addictions while adopting healthier coping strategies — truly a brain-based recovery program.

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Activities

1. List the three Cs of addiction and give an example of each one.
2. Complete the [Brief Substance Abuse Attitude Survey](#).
3. Visit the following link to learn more about addiction basics: [Addiction Policy Forum](#)

[Let's Talk About It...](#)

[How do you understand addiction? What characteristics of addiction make it similar to other diseases?](#)

Chapter One, Part One Quiz

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Part Two: The Costs of Addiction

Next, we will explore the costs of addiction to American society, while also turning an eye toward the cultural norms around drug use. In this section, keep in mind the ways that your culture influences certain behaviors, including whether you try a certain drug and which drugs are more acceptable than others.

This section includes a video from the former head of the Office of National Drug Control Policy, Michael Botinelli, as well as an excellent article from the National Institute on Drug Abuse that describes the science of addiction. There is also a slideshow that explores the societal costs of addiction and concludes by telling the *Tale of 10 Beers*, a metaphorical party that represents alcohol consumption among Americans.

Video

In this TED Talk, Michael Botticelli, the former Director of the Office of National Drug Control Policy, discusses why we should treat addiction as a disease.

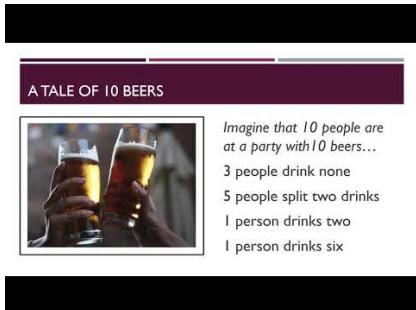
[Addiction is a Disease](#)

Reading

This pamphlet, produced by the National Institute on Drug Abuse, explains the effects of addiction on the brain and why it changes people's behavior.

[Drugs, Brains, and Behavior – The Science of Addiction](#)

Slides



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Activity

Visit the website [Our World in Data](#) to compare drinking in the United States to other countries. How does consumption in the U.S. compare to other countries? Which regions of the world have the highest rates, and which have the lowest rates? What might explain these variations?

Let's Talk About It...

- Thinking about *A Tale of 10 Beers* (PowerPoint), what are three reasons why someone might not drink alcohol?
 - How do social norms influence the use of drugs? What do you think are the social norms in the United States when it comes to alcohol? In other words, what are the messages about whether you should drink, at what age you can and cannot drink, how many drinks is a good limit, etc.?
-

Part Two Quiz

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Part Three: Our Relationship with Drugs of Abuse

In the final part of Chapter 1, we examine how each person has an individual relationship with drugs of abuse. These relationships are influenced by our genetics, our environment, and our life decisions. Pay particular attention to how Gabor Maté describes addiction in his captivating video, “The Power of Addiction.”

After that, there is an article and a slideshow that both describe the ways in which addiction can be viewed through the lens of relationships. Although dysfunctional, the relationship with addiction can become just as important as any other meaningful connection. The process of coming back from the relationship of addiction requires a grieving process and new, healthy relationships.

Finally, notice how addiction subtly hijacks the brain over time by overloading our primitive “go” system and impairing our rational “stop” system to create the central struggle of addictive behavior.

Video



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Article

Addiction, Heartbreak, and the Healing Power of Relationships

Relationships take on a multitude of forms, from friends united by common interests and shared experiences, to family members bound by genetics and loyalty. Our relationships are built around intimacy, connection, spirituality, and emotion. Some relationships last a lifetime, while others carry us through a particularly difficult stage of life. When they end, most relationships leave an individual in some manner of pain and grieving. Often, people do not want the relationship to end when it does. In this sense, perhaps no relationship is more powerful or hard to part with than the relationship of addiction.

For over half a century, the addictions field has worked to erase the stigma of addiction by reframing the problem not as one of morality or inadequate willpower, but rather as a complex illness marked by specific characteristics (DuPont, 2000; Kinney, 2012). Research now strongly supports the notion of addiction as a brain disease involving physiological changes in two key regions: the reward circuit in the limbic system, and the prefrontal cortex (National Institute on Drug Abuse, 2010; Inaba & Cohen, 2011). In the simplest terms, the human brain can be broken into two parts. The first is the “old brain,” responsible for our physical drives, raw emotions, and survival and pleasure instincts. The second is the “new brain” where higher-order planning, rational thinking, and judgment happen (Inaba & Cohen, 2011). The process of addiction hijacks both regions.

A cascade of neurotransmitters activated by substance use initiates the relationship between user and substance. The drug plays the role of activating the old brain’s reward system, which happens each time the user engages in the behavior (Kuhn, Swartzwelder, & Wilson, 2008; Inaba & Cohen, 2011). This relationship is unique because it is more reliable and predictable than most human relationships. Drugs are so effective at delivering their promised high that the individual comes to count on the pleasurable feeling with near 100% certainty. Future events, from celebrations to loss of a loved one, cue the brain to seek more of the drug.

According to the National Institute on Drug Abuse, the old brain becomes altered in such a way that it interprets the need for a drug as being equally or even more important than the need for food and sex (2010). Further exacerbating the problem is a change happening in the new brain, where the brakes should be applied to this runaway train. However, the prefrontal cortex also adapts to the drug and begins taking a backseat to the old brain’s drives. The ability to make sound, rational decisions is significantly impaired (National Institute on Drug Abuse, 2010). Thus, the brain is in a state of having a brick on the gas pedal and a malfunctioning brake line.

Understanding addiction as an intimate bond between an individual and a behavior helps counselors to conceptualize exactly what happens when a person cannot simply choose to change. As dysfunctional as the relationship becomes, the way out seems nearly impossible to the person suffering from addiction. A search for a logical explanation to this phenomenon yields confusion for friends, family, and for the user. The question of why certain people become addicted is as complicated as the brain itself, and there is no simple or complete answer. Genetics clearly play a central role, but environment, culture, access to substances, and personal choices are important as well (Kinney, 2012).

While some clients and counselors may find it important to flesh out the exact underpinnings of one’s addiction, more critical in the short term is finding ways to terminate the old relationship and begin the path toward change. Thus, the treatment for the relationship of addiction is new, healthy connections. These may come in the form of a positive client-counselor relationship, a sponsor, sober peers, healthy family members, a higher power, or a change in environment.

With abstinence, the brain begins to re-wire over time, although drug cravings are inevitable and notoriously difficult to fend off (Marlatt & Donovan, 2007; Kuhn, Swartzwelder, & Wilson, 2008). This is one area where counselors can make an important impact, helping clients to anticipate and avoid high-risk situations, or practice new coping skills. Clients who relapse and use the drug again have not committed a shameful act. Marlatt and Donovan (2007) warn that clients who view relapse as a failure will be more likely to repeat the unhealthy behavior and ultimately renew the harmful relationship. Instead, counselors and clients alike can use the experience as a learning tool.

While many factors co-occur with substance use, including trauma, mental illness, and medical concerns, counselors need to remember to treat addiction as a primary disorder (National Institute on Drug Abuse, 2010; Kinney, 2012). Addiction should not be viewed simply as the symptom of an underlying mental health issue. Treatment needs to center on the addiction. In many cases, especially with long-term use of alcohol, benzodiazepines, or opiates, a period of detoxification is necessary. Following that, a referral to a level of treatment appropriate to the client’s situation should be made, which may include meeting with a licensed counselor. If a client’s substance use disorder is beyond the scope of your training, make sure to provide ample resources. Referrals to treatment programs that accept various forms of payment should be made available. One good resource is SAMHSA’s free online treatment finder. Counselors can also provide information on local mutual help meetings, such as 12-Step groups and SMART Recovery.

When working with clients with addictions, remember that there is a physiological change that has taken place. Healing can and will happen, but expect it to take time and be patient with the process. Focus on ways to end the unhealthy, life-draining relationship of addiction, no matter how heartbreaking the loss may be. Shift the client into healthy, life-giving relationships that invoke passion, which is the opposite of addiction.

Key Takeaways

- **Addiction involves physiological changes.**
- **Healing can happen, but it takes time.**
- **Helping professionals can make a difference by teaching coping skills and providing referrals to self-help meetings.**

Written by Jason Florin and originally published in the Illinois Counseling Association’s newsletter, Contact.

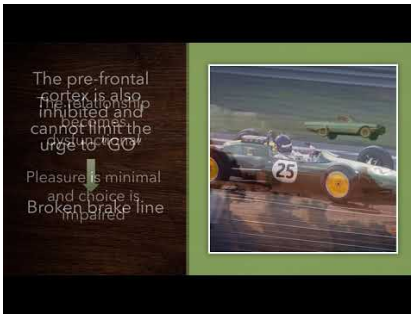
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Resources

- Treatment Finder
- Alcoholics Anonymous
- [SMART Recovery](#)

Slides



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Activities

1. Identify the primary functions of our old brain and our new brain. Label which one is responsible for our STOP system, and which is responsible for our GO system.
2. What are three traits that can be found in both relationships and addictive processes?

Let's Talk About It...

- Gabor Mate describes addiction as "being in the realm of hungry ghosts," a Buddhist expression for a creature who has an unending appetite that cannot be fulfilled. Think of another metaphor that would help someone visualize what addiction means.

Part Three Quiz

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Want to keep exploring? Try this free online course, [Addiction 101](#).

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1.2: Why Do People Use?

A common question that arises when talking about addiction is *why?* *Why* do people use? *Why* do some people become addicted while others don't? *Why* can't people who are addicted just stop?

These questions are understandable especially when individuals dealing with addiction have suffered catastrophic consequences as a result of their use. Yet the answers to these queries are complex, and there isn't a one-size-fits-all answer. In this chapter we will look to answer these common inquiries to gain a better understanding of addiction.

Nature or nurture? Yes!

Is the cause of addiction related to nature or nurture? Often a combination of factors contribute to the development of an addiction. Various theories of addiction seek to explain these factors. To better understand addiction, it is important to explore these theories and look at the risk factors.

Theories of Addiction

Morals and Personal Responsibility

A widely held societal belief is that addiction is simply a lack of willpower or moral compass. After all, it's hard to imagine why someone would continue a particular behavior despite having catastrophic consequences related to it. Many people assume that addiction is a matter of choice, and if the addicted person simply had willpower and would adhere to appropriate morals, they would be able to stop. This is not the case with addiction. Once the brain has been hijacked, the power of choice is removed even for the most righteous.

Chew on this: In a three-year longitudinal study done by Snoke, Levey, and Kennett (2016), researchers found no correlation between willpower and recovery success.

The Agent

With an agent model of addiction, the focus is on the drug, or the *agent*, and its powerful effects. Drugs affect the central nervous system, including the brain. The most significant area of the brain that is impacted by drugs is the nucleus accumbens, often referred to as the "pleasure center." Because of the drugs' ability to tantalize this pleasure center in profound ways, drugs are seen as the reason people use and become addicted. Not sure if this model of addiction is widely accepted? Simply look at "the war on drugs" which emphasizes the notion that if we simply get rid of the drugs, we'll get rid of the drug problem and thus addiction.

Genetics

Much research has been done to determine whether or not there is a genetic component related to addiction. Just as people may be genetically predisposed to certain diseases such as cancer or diabetes, so too may be the case with addiction. Given the findings from various studies, genetics does appear to play a role in the development of addiction. However, it's important to remember that individuals are complex beings with complex and unique experiences. Simply because a person is predisposed does not guarantee they will develop an addiction. However, they will be more *at risk* to develop one. More research into epigenetics, the study of the interaction between the environment and genetic make-up, is being conducted.

Learned Behavior

Social learning models of addiction focus on combinations of factors. One is that alcohol and drug use are behaviors that are influenced or *learned* from others (family and peers) who model that behavior. Another factor in social learning models is the importance of classical and operant conditioning. When drugs or alcohol are ingested into the body, involuntary reactions occur such as neurotransmitters being released (classical conditioning). The *consequence* of ingesting, often a pleasurable feeling, draws an individual back to use (operant conditioning). The expectations that person has as to what drugs or alcohol will do (the cognitive process and belief) are the final factor that comprise social learning models. Let's be honest . . . drug and alcohol use have some benefits; otherwise, people wouldn't use them. Of course there are negative consequences associated with using, such as hangovers, but those who are addicted overlook these disadvantages and focus on the pleasurable effects.

Sociocultural Influences

Sociocultural models take into account the societal environment in which people live and how that environment may influence use. The idea is that environments with higher levels of use, combined with easily accessible drugs and alcohol, place individuals at a higher risk for consumption. Furthermore, drugs and alcohol are often portrayed in advertising and media in positive ways. One

area of particular concern is disadvantaged communities. Look in any socioeconomically deprived area, and you are likely to find an abundance of liquor stores.

Public Health

The public health model is the most comprehensive model of addiction. It takes various factors into consideration when identifying the causes of addiction. These factors are broken into three categories: the agent (the drug), the host (the individual), and the environment (those factors outside of the individual). Addiction is viewed as the result of a complex relationship between biological, psychological, and social factors (Kinney, 2014). Because of the intricacy of this model, we feel it is the most comprehensive and best for guiding treatment.

Risk and Protective Factors

Risk factors can be internal (within the individual) or external (outside the individual). No single risk factor or combination of risk factors determines whether a person will develop an addiction. Instead, having one or more risk factors increases the chances that an individual who uses alcohol or other drugs will develop an addiction.

These risk factors include (in no particular order of importance):

- Having a mental health disorder
- Lack of family involvement
- Lower socioeconomic status
- Peer pressure
- Using drugs at an early age
- Chaotic home environment
- Poor social skills
- Drug availability
- Low self-esteem
- Poor academic performance or other school related problems
- Using drugs that have a higher likelihood of physical or psychological dependence (opiates, cocaine, etc.)
- Route of administration (such as smoking or injection)

The good news is, just as there are risk factors that can contribute to developing an addiction, so too are there protective factors that can help prevent addiction. Like risk factors, protective factors can be internal or external. Also, just as having one or more risk factors does not make addiction inevitable, having one or more protective factors is not a guarantee that an addiction will not develop.

These protective factors include (in no particular order of importance):

- Having a network of support
- Parental/family involvement
- Academic competence
- Having healthy coping strategies
- Sense of psychological and physical safety
- High self-esteem
- Ability to emotionally self-regulate
- Resiliency
- Social competence

Quiz

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Transtheoretical Model of Change

Professionals in the field of addiction often refer to the transtheoretical model of change created by James Prochaska and Carlo DiClemente to help people who do not have an addiction understand *why* people continue to use and *why* they might relapse/lapse. While studying behavior change, Prochaska and DiClemente identified six distinct stages that people tend to move through when making behavior changes. We will discuss those in just a moment.

For now, think of your own examples of behavior change. Perhaps you've tried to quit smoking. Maybe you have tried to implement a healthy eating plan or an exercise routine. Other examples of behavior change include stopping cussing, listening and communicating more effectively, avoiding procrastination, being more punctual, etc., etc. The list is truly endless. Chances are you have tried to make some type of behavior change in your life. Most of us have. Chances are, you were challenged with sticking to the new behavior. Most of us do experience a return to the old behavior, even if briefly. Hats off to those who set out to make a behavior change and stick to it without ever taking a backward step. They are often exceptions to the rule. If you are one of those people, kudos to you. Now let's look at the stages identified by Prochaska and DiClemente and see if you can relate those to your own behavior change process while we examine how it might look for the addicted individual.

The first stage they identified is what they termed *precontemplation*. In this stage, the individual doesn't realize there is a problem with their behavior. They may say something along the lines of, "Problem? What problem? I don't have a problem. I like to drink a little bit. So what? I work hard and I deserve to have a couple of drinks at the end of a long week."

The next stage is *contemplation*. During this stage, the individual starts to *contemplate* change, realizing that perhaps something needs to be different. This stage is also marked with ambivalence: sometimes the person thinks change is necessary; at other times, the status quo feels perfectly fine.

Following contemplation is *preparation*, where an individual begins to take steps to *prepare* for change. Those with a substance use disorder may make calls to treatment centers to gather information, or make inquiries about community-based support groups. No matter what the actions, the person is taking steps in the direction of change. However, it's important to note that an individual in this stage hasn't fully implemented the desired behavior change.

Next up is *action*. Just as the name suggests, individuals in this stage are engaging in the new behavior and have taken *action*. They are doing it! In the case of substance use disorders, the individual has stopped using (unless a harm reduction approach is being used). They have committed to the new behavior. Prochaska and DiClemente felt it important to make a distinction between this stage and the next. They suggested the action stage lasts from a period of 0 to 6 months.

Should the new behavior continue past 6 months, the individual then enters the *maintenance* phase. In this stage, the individual is *maintaining* their new behavior. Those in recovery from addiction have an abundance of pathways for maintaining the new behavior. From community-based support groups such as Alcoholics Anonymous and SMART Recovery, to avoiding people, places, and things associated with use, to taking up new interests and hobbies . . . the list could go on ad infinitum.

One of the defining features of addiction is the tendency toward *relapse*, the return to the old behavior. Relapse is the last stage of change identified by Prochaska and DiClemente. Most individuals who attempt to change a behavior experience a lapse or relapse (a lapse is temporary—a bump in the road—and a relapse is a prolonged return to the old behavior). In a study conducted by Kelly et al (2019), the researchers found that the average number of times an individual attempts recovery from addiction is 5.35. If lapses and relapses are typical with any behavior change, why would we expect recovery from addiction to be any different?

It is important to recognize that a lapse or relapse isn't a sign of complete failure. Rather, it is a time to reflect on what went wrong and what was missing from the behavior change plan. It is a time to build upon skills that were already learned and implemented as well as looking for new possibilities.

Quiz

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Summary

As we can see from this chapter, there isn't a simple answer as to one specific cause of addiction. Rather, there are many possible contributing factors. The more contributing factors (also known as *risk factors*) a person has, the more at risk they are of developing an addiction. The good news is there are also protective factors that can ward off risk factors and help prevent addiction from occurring. Our hope is that all who read this have a better understanding as to not only how addiction develops, but also why the simple suggestion, "Just stop!" isn't so simple.

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1.3: An Overview of Pharmacology

Having a working knowledge of the various psychoactive substances that are commonly used for recreational and medicinal purposes is important. It would be nearly impossible to maintain a list of all such substances because there are always new drugs being made, often in an attempt to avoid the legal restrictions placed on known drugs. However, a relatively small number of drugs actually create enough of an effect for people to repeatedly seek them out for their high. In this chapter, we highlight some of the primary drugs – and categories of drugs – that fall under this description.



Most people will recognize the names of many of these drugs in the table below. Alcohol, marijuana, heroin, cocaine, nicotine, ecstasy, and methamphetamine are well-known substances that can lead to the three Cs of addiction: compulsion, loss of control, and consequences.

This chapter begins with a video on psychoactive drugs to offer a context for the general categories of addictive drugs. There is also an interactive data chart created by the Substance Abuse and Mental Health Services Administration (SAMHSA) that allows you to compare drug use trends over time.

After that, you can view a chart highlighting the prevalence of several drugs of abuse, followed by a table listing of the most common drugs of abuse along with their uses, signs of intoxication, physiological effects, routes of administration, and withdrawal symptoms.

Next is a presentation on blood-alcohol concentration (BAC) that describes alcohol metabolism, factors that influence BAC, and drinking and driving laws.

The chapter concludes with *The Celebrated Drugs*, a look at three drugs that are widely recognized and promoted in modern U.S. culture. These drugs are alcohol, caffeine, and marijuana. That last one might surprise some people, especially if you grew up in a time when marijuana was considered just as dangerous as drugs like cocaine and heroin. However, marijuana has gained significant acceptance, along with innumerable references in music, movies, and media.



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Many drugs can alter a person's thinking and judgment and can lead to health risks, including addiction, drugged driving, infectious disease, and adverse effects on pregnancy. Information on commonly used drugs with the potential for misuse or addiction can be found here: [Commonly Used Drugs: Developed by the National Institute on Drug Abuse](#).

Use the chart of [Commonly Used Drugs](#) to answer the following questions:

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Activity

Using the interactive [Substance Abuse and Mental Health Data Archive](#), find the following information:

1. For 2017-2018, what was the prevalence of marijuana use among people 12 and older in the past month?
2. How does past-month alcohol use compare in 2017-2018 to 10 years earlier: higher, lower, or the same (within 1%)?
3. Which region had the lowest rate of past-month alcohol use by people age 18 and over: Midwest, New England, West Coast, or South?
4. Choose the description that best matches the trends in marijuana and cigarette use since 2010:
 - Both cigarette and marijuana use are increasing
 - Cigarette use is increasing and marijuana use is decreasing
 - Cigarette use is decreasing and marijuana use is increasing
 - Both cigarette and marijuana use are decreasing
5. The prevalence of pain reliever misuse among adults 18 and over is approximately what percentage: 2%, 4%, 6%, or 8%?

National Survey of Drug Use and Health: Trends in Prevalence of Various Drugs

National Survey on Drug Use and Health: Trends in Prevalence of Various Drugs for Ages 12 or Older, Ages 12 to 17, Ages 18 to 25, and Ages 26 or Older; 2016 - 2018 (in percent)*

Drug	Time Period	Ages 12 or Older			Ages 12 to 17			Ages 18 to 25			Ages 26 or Older		
		2016	2017	2018	2016	2017	2018	2016	2017	2018	2016	2017	2018
Alcohol	Lifetime	80.2	80.9	80.8	27	27.1	26.3	81.3	81.1	79.9	86.4	87.1	87.3
	Past Year	64.8	65.7	65.5	21.6	21.9	20.8	74.4	74	73.1	68.4	69.5	69.5
	Past Month	50.7	51.7	51.1	9.2	9.9	9	57.1	56.3	55.1	54.6	55.8	55.3
Cigarettes (any use)	Lifetime	57.4	57.1	55.7	11.6	10.8	9.6	50.5	49.5	45.9	64	63.8	62.6
	Past Year	22.7	21.5	21	7.2	6.3	5.5	31.7	31	27.9	23.1	21.7	21.7
	Past Month	19.1	17.9	17.2	3.4	3.2	2.7	23.5	22.3	19.1	20.2	18.9	18.5
Smokeless Tobacco	Lifetime	16.1	16.1	15.6	4.7	5	4.4	18.2	18	16.7	17.1	17.1	16.7

Drug	Time Period	Ages 12 or Older			Ages 12 to 17			Ages 18 to 25			Ages 26 or Older		
	Past Year	4.4	4.3	4	3	3	2.5	8	7.7	7.1	4	3.9	3.7
	Past Month	3.3	3.2	2.9	1.4	1.3	1.1	5.2	4.8	4.4	3.1	3.1	2.9
Illicit Drugs	Lifetime	48.5	49.5	49.2	23	23.9	23.9	56.3	57	55.6	50.2	51.3	51.2
	Past Year	18	19	19.4	15.8	16.3	16.7	37.7	39.4	38.7	15	16.1	16.7
	Past Month	10.6	11.2	11.7	7.9	7.9	8	23.2	24.2	23.9	8.9	9.5	10.1
Cocaine	Lifetime	14.4	14.9	14.7	0.9	0.7	0.7	11.3	12	11.4	16.6	17	16.8
	Past Year	1.9	2.2	2	0.5	0.5	0.4	5.6	6.2	5.8	1.4	1.7	1.6
	Past Month	0.7	0.8	0.7	0.1	0.1	0	1.6	1.9	1.5	0.6	0.7	0.7
Crack Cocaine	Lifetime	3.3	3.5	3.4	0.1	0.1	0.1	1.1	1.3	1	4	4.3	4.1
	Past Year	0.3	0.3	0.3	0	0.1	0	0.3	0.3	0.3	0.4	0.4	0.3
	Past Month	0.2	0.2	0.2	0	0	0	0	0.1	0.1	0.2	0.2	0.2
Hallucinogens	Lifetime	15.4	15.5	15.8	2.7	2.8	2.3	17.2	17.1	16.4	16.6	16.7	17.3
	Past Year	1.8	1.9	2	1.8	2.1	1.5	6.9	7	6.9	1	1	1.3
	Past Month	0.5	0.5	0.6	0.5	0.6	0.6	1.9	1.7	1.7	0.3	0.3	0.4
Heroin	Lifetime	1.8	1.9	1.9	0.1	0.1	0.1	1.6	1.8	1.3	2.1	2.2	2.2
	Past Year	0.4	0.3	0.3	0.1	0.1	0	0.7	0.6	0.5	0.3	0.3	0.3
	Past Month	0.2	0.2	0.1	0	0	0	0.3	0.3	0.2	0.2	0.2	0.1
Inhalants	Lifetime	9.1	9.3	9.1	8.3	8.6	8.5	9.8	9.5	9	9	9.3	9.1
	Past Year	0.6	0.6	0.7	2.2	2.3	2.7	1.4	1.6	1.5	0.3	0.3	0.4

Drug	Time Period	Ages 12 or Older			Ages 12 to 17			Ages 18 to 25			Ages 26 or Older		
	Past Month	0.2	0.2	0.2	0.6	0.6	0.7	0.4	0.5	0.4	0.2	0.1	0.1
LSD	Lifetime	9.6	9.6	10	1.2	1.5	1.3	8.3	9.1	9.8	10.8	10.6	11
	Past Year	0.7	0.8	0.8	0.8	1	0.8	3.4	3.8	3.5	0.3	0.3	0.4
	Past Month	0.1	0.2	0.2	0.2	0.2	0.2	0.6	0.8	0.7	0.1	0.1	0.1
Marijuana/Hashish	Lifetime	44	45.2	45.3	14.8	15.3	15.4	51.8	52.7	51.5	46.2	47.5	47.8
	Past Year	13.9	15	15.9	12	12.4	12.5	33	34.9	34.8	11	12.2	13.3
	Past Month	8.9	9.6	10.1	6.5	6.5	6.7	20.8	22.1	22.1	7.2	7.9	8.6
MDMA	Lifetime	6.9	7	7.3	1.2	1	0.8	11.6	12	10.5	6.7	7	7.5
	Past Year	0.9	0.9	0.9	0.7	0.7	0.5	3.5	3.5	3.1	0.5	0.5	0.6
	Past Month	0.2	0.2	0.3	0.1	0.2	0.2	0.9	0.7	0.7	0.1	0.1	0.2
Methamphetamine	Lifetime	5.4	5.4	5.4	0.3	0.3	0.3	2.4	3	2.5	6.5	6.4	6.5
	Past Year	0.5	0.6	0.7	0.1	0.2	0.2	0.8	1.1	0.8	0.5	0.6	0.7
	Past Month	0.2	0.3	0.4	0	0.1	0.1	0.2	0.4	0.3	0.3	0.3	0.4
PCP	Lifetime	2.4	2.2	2.2	0.2	0.2	0.1	0.7	0.8	0.6	2.9	2.7	2.7
	Past Year	0	0	0	0.1	0.1	0.1	0	0.1	0	0	0	0
	Past Month	0	0	0	0	0	0	0	0	0	0	0	0
Tranquilizers	Lifetime	0	0	-	0	0	-	0	0	-	0	0	-
	Past Year	2.2	2.2	2.1	1.7	1.8	1.7	5.3	5.5	4.6	1.8	1.7	1.7

Drug	Time Period	Ages 12 or Older			Ages 12 to 17			Ages 18 to 25			Ages 26 or Older		
	Past Month	0.7	0.6	0.6	0.5	0.5	0.3	1.5	1.6	1.2	0.6	0.5	0.5
Psychotherapeutics (Nonmedical Use)	Lifetime	0	0	-	0	0	-	0	0	-	0	0	-
	Past Year	6.9	6.6	6.2	5.3	4.9	4.8	14.5	14.4	12.3	5.9	5.6	5.3
	Past Month	2.3	2.2	2	1.6	1.5	1.3	4.6	4.5	3.7	2	1.9	1.8
Pain Relievers	Lifetime	0	0	-	0	0	-	0	0	-	0	0	-
	Past Year	4.3	4.1	3.6	3.5	3.1	2.8	7.1	7.2	5.5	3.9	3.7	3.4
	Past Month	1.2	1.2	1	1	0.9	0.6	1.8	1.8	1.4	1.2	1.1	1
Sedatives	Lifetime	0	0	-	0	0	-	0	0	-	0	0	-
	Past Year	0.6	0.5	0.4	0.4	0.3	0.3	0.7	0.6	0.6	0.6	0.5	0.4
	Past Month	0.2	0.1	0.1	0.1	0.1	0	0.1	0.2	0.1	0.2	0.1	0.1
Stimulants	Lifetime	0	0	-	0	0	-	0	0	-	0	0	-
	Past Year	2.1	2.1	1.9	1.7	1.8	1.5	7.5	7.4	6.5	1.3	1.3	1.2
	Past Month	0.6	0.7	0.6	0.4	0.5	0.5	2.2	2.1	1.7	0.4	0.5	0.4

The table below highlights the major categories of drugs of abuse. Each category includes examples, uses, routes of administration, signs of intoxication, effects, and withdrawal symptoms. Note that alcohol and benzodiazepines are chemically similar, and both can lead to severe and potentially deadly withdrawal. For this reason, chronic users of these drugs should receive medical supervision during withdrawal.

SEDATIVES / DEPRESSANTS	NICOTINE	OPIOIDS	STIMULANTS

	SEDATIVES / DEPRESSANTS	NICOTINE	OPIOIDS	STIMULANTS
EXAMPLES	Alcohol Barbiturates Seconal, Phenobarbitol	Cigarettes Cigars Pipes Chewing tobacco	Heroin Morphine Codeine Vicodin Oxycontin Dilaudid Fentanyl	Cocaine Caffeine Amphetamine Methamphetamine Ritalin, Adderall
USES	Recreational; alcohol withdrawal; treat anxiety; anti-convulsant	Recreational; smoking cessation	Pain relievers	Recreational; ADHD treatment; surgical anesthetic
ROUTES OF ADMINISTRATION	Oral (pills and liquid); crushed & snorted	Smoked; oral absorption	Oral, snorted, IV, smoked	Oral, snorted, IV, smoked
SIGNS OF INTOXICATION	Slurred speech; loss of coordination; sleepiness; impaired judgment; benzos can cause amnesia	N/A (Nicotine is poisonous but leaves the body rapidly after ingestion)	Nodding; depressed respiration rate; severe drowsiness; decreased motor activity; incoherent	Hyper-arousal; increased heart rate and breathing; rapid speech; paranoia
PHYSIOLOGICAL EFFECTS	Altered brain function; cognitive impairment; Lowered heart rate, respiration, and BP	Initially increases, then decreases respiration and heart rate; rapidly acts in the lungs and moves to the brain; related to many types of cancer, brain damage, COPD	Decreased respiration; used to alleviate or prevent pain; intense high when misused; overdoses are usually associated with adulterants	Increased respiration, heart rate, and BP; impairment in motor function; cognitive deficits
WITHDRAWAL SYMPTOMS	Increased heart rate and BP; Delirium Tremens; anxiety; sweating, fever; dizziness; personality changes	Intense craving for more of the drug; irritability	Diarrhea; profuse sweating; shaking; fever; nausea; sleeplessness; "flu-like symptoms"	Depressed mood; irritability; headaches; possible psychosis; anxiety; sleep disturbances; anhedonia

	HALLUCINOGENS	INHALANTS	MARIJUANA	DISSOCIATIVES
EXAMPLES	Psilocybin Flowers, edibles, oils	PCP Ketamine Dextromethorphan Salvia divinorum Nitrous oxide		

	HALLUCINOGENS	INHALANTS	MARIJUANA	DISSOCIATIVES
USES	Recreational; couples therapy (MDMA)	Recreational; no medical benefit	Recreational; pain management; appetite stimulant	Recreational; surgery; depression treatment
SIGNS OF INTOXICATION	Nonsensical thoughts and speech; visual & auditory hallucinations (tactile hallucinations also possible)	Visible red marks around the lips and nose; incoherent speech; uncoordinated movement	Bloodshot eyes; possible hallucinations; decreased motor coordination	Hallucinations; feelings of detachment
PHYSIOLOGICAL EFFECTS	Acute or chronic psychotic episodes; flashbacks	Irregular heartbeat (possible death); Significant damage to brain cells, causing irreversible damage; psychiatric and neurological problems; headaches; sensitivity to light	Difficulty forming short-term memories; increased onset of mental illness; orthostatic hypotension; peripheral neuropathy; increased risk of lung damage and cancer	Memory loss; changes in blood pressure; slowed heart rate and respiration; feelings of extreme panic; aggression; respiratory arrest
WITHDRAWAL SYMPTOMS	Cravings; irritability	Anxiety, depression, irritability; aggressive behavior; hallucinations	Insomnia; disturbances in sleeping and dreaming; anxiety; change of appetite; weight loss; irritability	Cravings; headaches; sweating; depression; social withdrawal

**Ecstasy, or MDMA, has several effects and is technically an entactogen. It has properties of stimulants and hallucinogens.*

Activity

Click the following link to view an activity developed by the University of Utah that highlights brain changes related to methamphetamine use: [METH MOUSE](#)

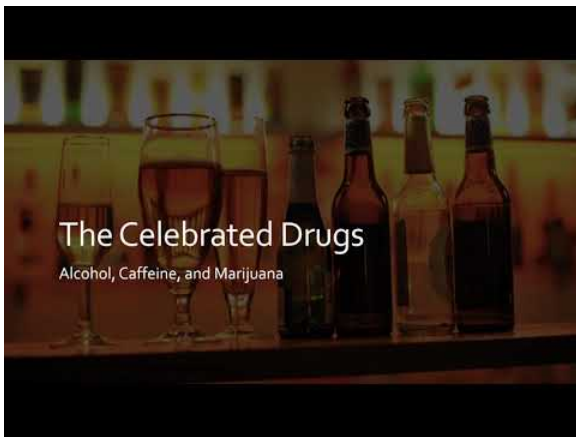
Activity

Use the flashcards below to test yourself on several drug definitions.

An interactive or media element has been excluded from this version of the text. You can view it online here: <https://cod.pressbooks.pub/addiction/?p=92>

Click through the presentation below to explore information on blood-alcohol concentration.

An interactive or media element has been excluded from this version of the text. You can view it online here: <https://cod.pressbooks.pub/addiction/?p=92>



A YouTube element has been excluded from this version of the text. You can view it online here: <https://cod.pressbooks.pub/addiction/?p=92>

Let's Talk About It... The Opioid Epidemic: According to the U.S. Department of Health and Human Services, more than 750,000 people have died from a drug overdose since the year 2000, the majority of which are from opioids. How did this epidemic happen, what can we do to stop it, and what needs to be done to prevent it from happening again?

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1.4: Special Considerations

Now that you have a sense of how to define addiction, along with a grasp of the role that drugs play in our society, it is time to turn our attention to additional issues. We call these special considerations because they are important to think about in the context of how addiction develops.

Addiction knows no boundaries. It doesn't care about your gender, race, ethnicity, age, socioeconomic status, religion, or occupation. It can affect anyone at any point along the lifespan. However, a few populations have a special connection to or relationship with addiction.

This chapter examines drug use among older adults, as well as information on conditions that impact the development of addiction, such as co-occurring disorders, trauma, and chronic pain. The chapter concludes by discussing how behavioral addictions like compulsive gambling, shopping, or internet use fit into our definition.

Substance Use in Older Adults

Source: National Institute on Drug Abuse; National Institutes of Health; U.S. Department of Health and Human Services. Updated 2020

The scope of substance use in older adults

While illicit drug use typically declines after young adulthood, nearly 1 million adults aged 65 and older live with a substance use disorder (SUD), as reported in 2018 data.¹ While the total number of SUD admissions to treatment facilities between 2000 and 2012 differed slightly, the proportion of admissions of older adults increased from 3.4% to 7.0% during this time.²

Are older adults impacted differently by alcohol and drugs?

Aging could possibly lead to social and physical changes that may increase vulnerability to substance misuse. Little is known about the effects of drugs and alcohol on the aging brain. However, older adults typically metabolize substances more slowly, and their brains can be more sensitive to drugs.³ One study suggests that people addicted to cocaine in their youth may have an accelerated age-related decline in temporal lobe gray matter and a smaller temporal lobe compared to control groups who do not use cocaine. This could make them more vulnerable to adverse consequences of cocaine use as they age.¹⁹

Older adults may be more likely to experience mood disorders, lung and heart problems, or memory issues. Drugs can worsen these conditions, exacerbating the negative health consequences of substance use. Additionally, the effects of some drugs—like impaired judgment, coordination, or reaction time—can result in accidents, such as falls and motor vehicle crashes. These sorts of injuries can pose a greater risk to health than in younger adults and coincide with a possible longer recovery time.

Prescription Medicines

Chronic health conditions tend to develop as part of aging, and older adults are often prescribed more medicines than other age groups, leading to a higher rate of exposure to potentially addictive medications. One study of 3,000 adults aged 57-85 showed common mixing of prescription medicines, nonprescription drugs, and dietary supplements. More than 80% of participants used at least one prescription medication daily, with nearly half using more than five medications or supplements,⁵ putting at least 1 in 25 people in this age group at risk for a major drug-drug interaction.⁵

Other risks could include accidental misuse of prescription drugs and possible worsening of existing mental health issues. For example, a 2019 study of patients over the age of 50 noted that more than 25% who misuse prescription opioids or benzodiazepines expressed suicidal ideation, compared to 2% who do not use them, underscoring the need for careful screening before prescribing these medications.⁶

Opioid Pain Medicines

Persistent pain may be more complicated in older adults experiencing other health conditions. Up to 80% of patients with advanced cancer report pain, as well as 77% of heart disease patients, and up to 40% of outpatients 65 and older. Between 4-9% of adults age 65 or older use prescription opioid medications for pain relief.⁷ From 1995 to 2010, opioids prescribed for older adults during regular office visits increased by a factor of nine.⁷

The U.S. population of adults 55 and older increased by about 6% between 2013-2015, yet the proportion of people in that age group seeking treatment for opioid use disorder increased nearly 54%.⁴ The proportion of older adults using heroin—an illicit opioid—more than doubled between 2013-2015,⁴ in part because some people misusing prescription opioids switch to this cheaper drug.⁴

Marijuana

Nine percent of adults aged 50-64 reported past year marijuana use in 2015-2016, compared to 7.1% in 2012-2013.¹⁰ The use of cannabis in the past year by adults 65 years and older increased sharply from 0.4% in 2006 and 2007 to 2.9% in 2015 and 2016.²²

Medical Marijuana

One U.S. study suggests that close to a quarter of marijuana users age 65 or older report that a doctor had recommended marijuana in the past year.¹⁰ Research suggests medical marijuana may relieve symptoms related to chronic pain, sleep hygiene, malnutrition, depression, or to help with side effects from cancer treatment.¹¹ It is important to note that the marijuana plant has not been approved by the Food and Drug Administration (FDA) as a medicine. Therefore, the potential benefits of medical marijuana must be weighed against its risks, particularly for individuals who have other health conditions or take prescribed medications.¹¹

Risks of Marijuana Use

Regular marijuana use for medical or other reasons at any age has been linked to chronic respiratory conditions, depression, impaired memory, adverse cardiovascular functions, and altered judgment and motor skills.¹² Marijuana can interact with a number of prescription drugs and complicate already existing health issues and common physiological changes in older adults.

Nicotine

The Centers for Disease Control and Prevention (CDC) reports that in 2017, about 8 of every 100 adults aged 65 and older smoked cigarettes, increasing their risk for heart disease and cancer.²⁰ While this rate is lower than that for younger adults, research suggests that older people who smoke have increased risk of becoming frail, though smokers who have quit do not appear to be at higher risk.¹⁴ Although about 300,000 smoking-related deaths occur each year among people who are age 65 and older, the risk diminishes in older adults who quit smoking.¹³ A typical smoker who quits after age 65 could add two to three years to their life expectancy. Within a year of quitting, most former smokers reduce their risk of coronary heart disease by half.¹³

Nicotine Vaping

There has been little research on the effects of vaping nicotine (e-cigarettes) among older adults; however, certain risks exist in all age groups. Some research suggests that e-cigarettes might be less harmful than cigarettes when people who regularly smoke switch to vaping as a complete replacement. However, research on this is mixed, and the FDA has not approved e-cigarettes as a smoking cessation aid. There is also evidence that many people continue to use both delivery systems to inhale nicotine, which is a highly addictive drug.

Alcohol

Alcohol is the most used drug among older adults, with about 65% of people 65 and older reporting high-risk drinking, defined as exceeding daily guidelines at least weekly in the past year.¹⁶ Of particular concern, more than a tenth of adults age 65 and older currently binge drink,¹⁸ which is defined as drinking five or more drinks on the same occasion for men, and four or more drinks on the same occasion for women. In addition, research published in 2020 shows that increases in alcohol consumption in recent years have been greater for people aged 50 and older relative to younger age-groups.²¹

Alcohol Use Disorder: Most admissions to substance use treatment centers in this age group relate to alcohol.² One study documented a 107% increase in alcohol use disorder among adults aged 65 years and older from 2001 to 2013.¹⁶ Alcohol use disorder can put older people at greater risk for a range of health problems, including diabetes, high blood pressure, congestive heart failure, liver and bone problems, memory issues and mood disorders.¹⁶

Risk Factors for Substance Use Disorders in Older Adults

Physical risk factors for substance use disorders in older adults can include: chronic pain; physical disabilities or reduced mobility; transitions in living or care situations; loss of loved ones; forced retirement or change in income; poor health status; chronic illness; and taking a lot of medicines and supplements. Psychiatric risk factors include: avoidance coping style; history of substance use disorders; previous or current mental illness; and feeling socially isolated.¹⁹

How are substance use disorders treated in older adults?

Many behavioral therapies and medications have been successful in treating substance use disorders in older adults. Little is known about the best models of care, but research shows that older patients have better results with longer durations of care.⁷ Ideal models include diagnosis and management of other chronic conditions, re-building support networks, improving access to medical services, improved case management, and staff training in evidence-based strategies for this age group.⁷

Providers may confuse SUD symptoms with those of other chronic health conditions or with natural, age-related changes. Research is needed to develop targeted SUD screening methods for older adults. Integrated models of care for those with coexisting medical and psychiatric conditions are also needed.² It is important to note that once in treatment, people can respond well to care.²

Key Takeaways

- While use of illicit drugs in older adults is much lower than among other adults, it is currently increasing.
- Older adults are often more susceptible to the effects of drugs, because as the body ages, it often cannot absorb and break down drugs and alcohol as easily as it once did.
- Older adults are more likely to unintentionally misuse medicines by forgetting to take their medicine, taking it too often, or taking the wrong amount.
- Some older adults may take substances to cope with big life changes such as retirement, grief and loss, declining health, or a change in living situation.
- Most admissions to substance use treatment centers in this age group are for alcohol.
- Many behavioral therapies and medications have been successful in treating substance use disorders, although medications are underutilized.
- It is never too late to quit using substances—quitting can improve quality of life and future health.
- More science is needed on the effects of substance use on the aging brain, as well as into effective models of care for older adults with substance use disorders.
- Providers may confuse symptoms of substance use with other symptoms of aging, which could include chronic health conditions or reactions to stressful, life-changing events. References:
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Part Two: Conditions that Impact the Development of Addiction

In 21st-century treatment centers, few clients are treated solely for a substance use disorder. In most cases, clients present with an extensive history that might involve mental health issues, trauma, attempts to manage chronic pain, or all of the above. It is critical for helping professionals, along with family members and friends, to understand the complex interaction of these problems.

We mentioned in Chapter 1 that addiction is a primary disorder, meaning that it requires its own treatment and is not simply a symptom of another problem. That said, addiction is rarely the only issue that someone is struggling with. Anxiety, depression, bipolar disorder, unresolved trauma, and severe pain are all commonly seen by helping professionals while treating addictive disorders.

The following interactive video explains the importance of treating co-occurring disorders in an integrated manner:

A link to an interactive elements can be found at the bottom of this page.

SAMHSA's Concept of Trauma and Guidance for a Trauma-Informed Approach

The convergence of the trauma survivor's perspective with research and clinical work has underscored the central role of traumatic experiences in the lives of people with mental and substance use conditions. The connection between trauma and these conditions offers a potential explanatory model for what has happened to individuals, both children and adults, who come to the attention of the behavioral health and other service systems.

People with traumatic experiences, however, do not show up only in behavioral health systems. Responses to these experiences often manifest in behaviors or conditions that result in involvement with the child welfare and the criminal and juvenile justice system or in difficulties in the education, employment, or primary care system. Recently, there has also been a focus on individuals in the military and increasing rates of post-traumatic stress disorder.

SAMHSA's Definition of Trauma

Individual trauma results from an event, series of events, or set of circumstances that is experienced by an individual as physically or emotionally harmful or life-threatening and that has lasting adverse effects on the individual's functioning and mental, physical, social, emotional, or spiritual well-being.

The six key principles fundamental to a trauma-informed approach include:

1. Safety

Throughout the organization, staff and the people they serve, whether children or adults, feel physically and psychologically safe; the physical setting is safe and interpersonal interactions promote a sense of safety. Understanding safety as defined by those served is a high priority.

2. Trustworthiness and Transparency

Organizational operations and decisions are conducted with transparency with the goal of building and maintaining trust with clients and family members, among staff, and others involved in the organization.

3. Peer Support

Peer support and mutual self-help are key vehicles for establishing safety and hope, building trust, enhancing collaboration, and utilizing stories and lived experiences to promote recovery and healing. The term peers refers to individuals with lived experiences of trauma. In the case of children, these may be members of their family who have experienced traumatic events and are key caregivers in their recovery. Peers have also been referred to as trauma survivors.

4. Collaboration and Mutuality

Importance is placed on partnering and the leveling of power differences between staff and clients and among organizational staff from clerical and housekeeping personnel, to professional staff to administrators, demonstrating that healing happens in

relationships and in the meaningful sharing of power and decision-making. The organization recognizes that everyone has a role to play in a trauma-informed approach. As one expert stated, “one does not have to be a therapist to be therapeutic.”

5. Empowerment, Voice and Choice

Throughout the organization and among the clients served, individuals’ strengths and experiences are recognized and built upon. The organization fosters a belief in the primacy of the people served; in resilience; and in the ability of individuals, organizations, and communities to heal and promote recovery from trauma. The organization understands that the experience of trauma may be a unifying aspect in the lives of those who run the organization, who provide the services, and/ or who come to the organization for assistance and support. As such, operations, workforce development, and services are organized to foster empowerment for staff and clients alike. Organizations understand the importance of power differentials and ways in which clients, historically, have been diminished in voice and choice and are often recipients of coercive treatment. Clients are supported in shared decision-making, choice, and goal setting to determine the plan of action they need to heal and move forward. They are supported in cultivating self-advocacy skills. Staff are facilitators of recovery rather than controllers of recovery. Staff are empowered to do their work as well as possible by adequate organizational support. This is a parallel process as staff need to feel safe, as much as people receiving services.

6. Cultural, Historical, and Gender Issues

The organization actively moves past cultural stereotypes and biases (based on race, ethnicity, sexual orientation, age, religion, gender-identity, geography, etc.); offers access to gender-responsive services; leverages the healing value of traditional cultural connections; incorporates policies, protocols, and processes that are responsive to the racial, ethnic and cultural needs of individuals served; and recognizes and addresses historical trauma.

The Trauma-Addiction Connection

When a person fears for his/her safety, experiences intense pain, or witnesses a tragic or violent act, that person can be described as having experienced trauma. Levels of resiliency vary from person to person, so reactions to traumatic events are similarly varied. Although frightening experiences impact people at any age, adults will generally be more likely to manage through trauma than children will be. Further, some trauma is repeated or ongoing, such as that of child abuse or military combat. Other examples of traumatic events include car accidents, repeated bullying, street violence, sexual assault, domestic violence, growing up in an unstable home, natural disasters, or battling a life-threatening condition.

If trauma and the feelings associated with it are not resolved, serious long-term issues can develop. Post-traumatic stress disorder (PTSD) disrupts the lives of people who have experienced unresolved trauma by negatively impacting their relationships, emotions, physical body, thinking and behavior. PTSD sufferers may experience sleep disturbances, nightmares, anxiety and depression, flashbacks, dissociative episodes in which they feel disconnected from reality, excessive fears, self-injurious behaviors, impulsivity and addictive traits.

Researchers have been studying the connection between trauma and addiction in order to understand why so many drug and alcohol abusers have histories of traumatic experiences. Data from over 17,000 patients in Kaiser Permanente’s Adverse Childhood Experiences study indicate that a child who experiences four or more traumatic events is five times more likely to become an alcoholic, 60% more likely to become obese, and up to 46 times more likely to become an injection-drug user than the general population. Other studies have found similar connections between childhood trauma and addiction, and studies by the Veterans Administration have led to estimates that between 35-75% of veterans with PTSD abuse drugs and alcohol.

The reasons behind this common co-occurrence of addiction and trauma are complex. For one thing, some people struggling to manage the effects of trauma in their lives may turn to drugs and alcohol to self-medicate. Post-traumatic stress disorder symptoms like agitation, hypersensitivity to loud noises or sudden movements, depression, social withdrawal and insomnia may seem more manageable through the use of sedating or stimulating drugs depending on the symptom. However, addiction soon becomes yet another problem in the trauma survivor’s life. Before long, the “cure” no longer works, and it causes far more pain to an already suffering person.

Other possible reasons addiction and trauma are often found together include the theory that a substance abuser’s lifestyle puts him/her in harm’s way more often than that of a non-addicted person. Unsavory acquaintances, dangerous neighborhoods, impaired driving, and other aspects commonly associated with drug and alcohol abuse may indeed predispose substance abusers to being traumatized by crime, accidents, violence and abuse. There may also be a genetic component linking people prone toward PTSD and those with addictive tendencies, although no definitive conclusion has been made by research so far.

First Things First

Sometimes, years of self-medicating through drugs and alcohol have effectively dulled the memory of trauma, so the only problem seems to be substance abuse and addiction. A person who has suppressed or ignored traumatic experiences may work very hard to get and stay sober, only to find other addictive behaviors eventually replacing the drugs and alcohol. These might include compulsive overeating, gambling, sexual promiscuity or any other compulsion-driven behavior. Unfortunately, continuing to avoid resolution of trauma will almost guarantee ongoing suffering.

However, dealing with traumatic experiences is challenging work. Under the influence of drugs and alcohol, it is a nearly impossible task. That is why therapists always recommend working first on recovery from drug addiction and alcoholism. Then, when the trauma survivor is stronger and more clear-minded, s/he can begin working with a therapist in individual or group counseling to address the underlying problem of unresolved trauma. Specific treatment modalities have been developed for people suffering long-term effects after traumatic experiences, including trauma-focused therapies, PTSD Intervention, Body Psychotherapy which targets the physiological response to trauma, and medications for depression and anxiety.

Considering the frequent link between trauma and addiction, anyone working on recovery from substance abuse and addiction could benefit from an assessment by a skilled therapist, to determine if there are underlying issues that should be addressed and to devise an appropriate treatment plan. The best approach is always to work first on living a sober life, then on resolving past trauma and learning positive coping skills, thereby breaking the trauma-addiction connection and finding a better life all around.

Hackensack Meridian Carrier Clinic. (2019). Trauma and addiction. Retrieved from <https://carrierclinic.org/2019/08/06...and-addiction/>

For more information, visit carrierclinic.org

The following video, produced by the Carrier Clinic, highlights the significant link between post-traumatic stress disorder and addiction.



A YouTube element has been excluded from this version of the text. You can view it online here: <https://cod.pressbooks.pub/addiction/?p=44>

The following video examines the ways trauma and addiction are linked. The issue of trauma has become one of the most important concepts in the treatment of addiction.



A YouTube element has been excluded from this version of the text. You can view it online here: <https://cod.pressbooks.pub/addiction/?p=44>

NAMI Guide to Dual Diagnosis

Dual Diagnosis

Dual diagnosis (also referred to as [co-occurring disorders](#)) is a term for when someone experiences a mental illness and a substance use disorder simultaneously. Either disorder—substance use or mental illness—can develop first. People experiencing a mental health condition may turn to alcohol or other drugs as a form of self-medication to improve the mental health symptoms they experience. However, research shows that alcohol and other drugs worsen the symptoms of mental illnesses. The professional fields of mental health and substance use recovery have different cultures, so finding integrated care can be challenging.

How Common Is Dual Diagnosis?

According to a 2014 National Survey on Drug Use and Health, [7.9 million](#) people in the U.S. experience both a mental disorder and substance use disorder simultaneously. More than half of those people—4.1 million to be exact—are men.

Symptoms

Because many combinations of dual diagnosis can occur, the symptoms vary widely. Mental health clinics are starting to use alcohol and drug [screening tools](#) to help identify people at risk for drug and alcohol abuse. Symptoms of substance use disorder may include:

- Withdrawal from friends and family
- Sudden changes in behavior
- Using substances under dangerous conditions
- Engaging in risky behaviors
- Loss of control over use of substances
- Developing a high tolerance and withdrawal symptoms
- Feeling like you need a drug to be able to function

Symptoms of a mental health condition can also vary greatly. [Warning signs](#), such as extreme mood changes, confused thinking or problems concentrating, avoiding friends and social activities and thoughts of suicide, may be reason to seek help.

How Is Dual Diagnosis Treated?

The best treatment for dual diagnosis is integrated intervention, when a person receives care for both their diagnosed mental illness and substance abuse. The idea that “I cannot treat your depression because you are also drinking” is outdated—current thinking requires *both* issues be addressed.

You and your treatment provider should understand the ways each condition affects the other and how your treatment can be most effective. Treatment planning will not be the same for everyone, but here are the common methods used as part of the treatment plan:

Detoxification. The first major hurdle that people with dual diagnosis will have to pass is detoxification. Inpatient detoxification is generally more effective than outpatient for initial sobriety and safety. During inpatient detoxification, trained medical staff monitor

a person 24/7 for up to seven days. The staff may administer tapering amounts of the substance or its medical alternative to wean a person off and lessen the effects of withdrawal.

Inpatient Rehabilitation. A person experiencing a mental illness and dangerous/dependent patterns of substance use may benefit from an inpatient rehabilitation center where they can receive medical and mental health care 24/7. These treatment centers provide therapy, support, medication and health services to treat the substance use disorder and its underlying causes.

Supportive Housing, like group homes or sober houses, are residential treatment centers that may help people who are newly sober or trying to avoid relapse. These centers provide some support and independence. Sober homes have been criticized for offering varying levels of quality care because licensed professionals do not typically run them. Do your research when selecting a treatment setting.

Psychotherapy is usually a large part of an effective dual diagnosis treatment plan. In particular, cognitive-behavioral therapy (CBT) helps people with dual diagnosis learn how to cope and change ineffective patterns of thinking, which may increase the risk of substance use.

Medications are useful for treating mental illnesses. [Certain medications](#) can also help people experiencing substance use disorders ease withdrawal symptoms during the detoxification process and promote recovery.

Self-Help and Support Groups. Dealing with a dual diagnosis can feel challenging and isolating. Support groups allow members to share frustrations, celebrate successes, find referrals for specialists, find the best community resources and swap recovery tips. They also provide a space for forming healthy friendships filled with encouragement to stay clean. Here are some groups NAMI likes:

- [Double Trouble in Recovery](#) is a 12-step fellowship for people managing both a mental illness and substance abuse.
- Alcoholics Anonymous and [Narcotics Anonymous](#) are 12-step groups for people recovering from alcohol or drug addiction. Be sure to find a group that understands the role of mental health treatment in recovery.
- [Smart Recovery](#) is a sobriety support group for people with a variety of addictions that is *not* based in faith.

Chronic Pain Management

Excerpted from SAMHSA TIP 54: Managing Chronic Pain in Adults With or in Recovery From Substance Use Disorders

Chronic non-cancer pain (CNCP) is a major challenge for clinicians as well as for the patients who suffer from it. The complete elimination of pain is rarely obtainable for any substantial period. Therefore, patients and clinicians should discuss treatment goals that include reducing pain, maximizing function, and improving quality of life. The best outcomes can be achieved when chronic pain management addresses co-occurring mental disorders (e.g., depression, anxiety) and when it incorporates suitable nonpharmacologic and complementary therapies for symptom management.

Treatment recommendations:

- Treat chronic pain with non-opioid pain relievers as determined by pathophysiology
- Recommend or prescribe nonpharmacological therapies (e.g., cognitive–behavioral therapy, exercises to decrease pain and improve function)
- Treat comorbidities
- Assess treatment outcomes
- Initiate opioid therapy only if the potential benefits outweigh risk and only for as long as it is unequivocally beneficial to the patient
- Therapeutic exercise
- Physical therapy
- Cognitive–behavioral therapy
- Complementary and alternative medicine (CAM; e.g., chiropractic therapy, massage therapy, acupuncture, mind-body therapies, relaxation strategies)

Part Three: Behavioral Addictions



As you may know, the Diagnostic and Statistical Manual (DSM) is the source of psychiatric diagnoses in the United States. Its updated publications are eagerly anticipated and scrutinized throughout the field of mental health because it holds such significant influence. The language we use to discuss mental health issues, whether or not an insurance company will pay for a certain treatment, and whether a condition is even considered a disorder, are all part of the impact felt by this book. While the diagnostic manual has been criticized ([Dr. William Glasser](#), founder of Reality Therapy, once called it “the most destructive book to human relationships ever written”), it maintains its prominent role in modern American psychology.

Currently, the DSM recognizes only one other addiction besides substance use disorder, and that is [gambling disorder](#). The characteristics of compulsive gambling are quite similar to those found in substance use disorder.

Although other behaviors have yet to receive the same recognition, it is clear that the negative patterns associated with them match our present understanding of addiction. These can include shopping, spending, sex, internet gaming, relationships, eating, and other related behaviors.

As you will see in this section’s video, Dr. Robert Lefever has identified three clusters of addictive behaviors, which he labels as follows:

The Hedonistic Cluster:

- Psychoactive substances such as alcohol, marijuana, heroin, cocaine, prescription pills, and methamphetamine
- Caffeine
- Nicotine
- Gambling
- Sex without regard for the other person

The Nurturement of Self Cluster:

- Food, especially those containing sugar and refined flour
- Bingeing/starving/purging/vomiting
- Shopping and spending
- Work
- Internet and computer use
- Exercise

The Relationship Cluster

- Use of other people (intimate partner or co-workers)
- Compulsive helping

Lefever notes that the outlets within each cluster are related in a way that makes it more likely that a person in recovery will relapse if he or she engages in any of the others in the same cluster. He also notes that people may have addictions in more than one cluster. This concept provides an excellent way of understanding the many faces of addiction. It also points toward the necessity of avoiding other behaviors within the same cluster.



A YouTube element has been excluded from this version of the text. You can view it online here: <https://cod.pressbooks.pub/addiction/?p=44>

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Chapter Quiz

A link to an interactive elements can be found at the bottom of this page.

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1.5: Adolescents and Addiction

Drug Use Among Adolescents



Dr. Mark Willenbring of the National Institute of Alcohol Abuse and Alcoholism describes addiction as “a disorder of young people” (2007). He believes that approximately 75% of addiction develops by the age of 25, which roughly corresponds to the age when the pre-frontal cortex in a person’s brain finishes forming.

If addiction begins in adolescence, we must question, why that is the case? The answer is that this is the age when our brains are most vulnerable to the effects of drugs, while we are also our most curious and risk-taking selves. The perceived danger of trying drugs is lowest among high school students, and their desire to try novel things is at its peak.

Adolescence is the psychosocial life stage that Erik Erikson defined as Identity vs. Role Confusion, a time when we struggle to determine who we are and what we value. Drug experimentation is often part of this quest. In essence, our individual relationship with various drugs of abuse is first being developed during this window of time, and that relationship frequently carries into adulthood and the rest of our life.

Adolescents may be the group most vulnerable to the impact of drugs, but people of all ages can be affected. As we age, we experience significant physical, emotional, and spiritual changes in our lives that can lead to increased drug use and even addiction in our older adult years. In this section, we also examine the impact of drug use by older adults.

Exercise

Before reading the next section, think about your own experience with adolescence and how it helped shape your identity. In particular, consider how the following might have affected you while growing up:

- Relationships with family and friends
- Intimate relationships
- Physical changes
- School experiences
- Loss of a loved one
- Living environment
- Involvement in activities such as sports, band, theater, etc.
- Having friends or loved ones who used drugs

- Experiencing any major illnesses or injuries
- Significant social and political events
- Religious involvement
- Inspirational experiences (e.g., a memorable trip, a book, a movie, or a song that inspired you)

Did any of these influences lead you to engage in high-risk behaviors, whether related to drug use or not?

Treatment for Adolescents

The following section is from the National Institute on Drug Abuse. You can find the original online at the following link: [Principles of Adolescent Substance Use Disorder Treatment](#).

Adolescents experiment with drugs or continue taking them for several reasons, including:

- **To fit in:** Many teens use drugs “because others are doing it”—or they *think* others are doing it—and they fear not being accepted in a social circle that includes drug-using peers.
- **To feel good:** Abused drugs interact with the neurochemistry of the brain to produce feelings of pleasure. The intensity of this euphoria differs by the type of drug and how it is used.
- **To feel better:** Some adolescents suffer from depression, social anxiety, stress-related disorders, and physical pain. Using drugs may be an attempt to lessen these feelings of distress. Stress especially plays a significant role in starting and continuing drug use as well as returning to drug use (relapsing) for those recovering from an addiction.
- **To do better:** Ours is a very competitive society, in which the pressure to perform athletically and academically can be intense. Some adolescents may turn to certain drugs like illegal or prescription stimulants because they think those substances will enhance or improve their performance.
- **To experiment:** Adolescents are often motivated to seek new experiences, particularly those they perceive as thrilling or daring.

Addiction occurs when repeated use of drugs changes how a person’s brain functions over time. The transition from voluntary to compulsive drug use reflects changes in the brain’s natural inhibition and reward centers that keep a person from exerting control over the impulse to use drugs even when there are negative consequences—the defining characteristic of addiction.

Some people are more vulnerable to this process than others, due to a range of possible risk factors. Stressful early life experiences such as being abused or suffering other forms of trauma are one important risk factor. Adolescents with a history of physical and/or sexual abuse are more likely to be diagnosed with substance use disorders.³⁰ Many other risk factors, including genetic vulnerability, prenatal exposure to alcohol or other drugs, lack of parental supervision or monitoring, and association with drug-using peers also play an important role.³¹

At the same time, a wide range of genetic and environmental influences that promote strong psychosocial development and resilience may work to balance or counteract risk factors, making it ultimately hard to predict which individuals will develop substance use disorders and which won’t.

Drug use in adolescents frequently overlaps with other mental health problems. For example, a teen with a substance use disorder is more likely to have a mood, anxiety, learning, or behavioral disorder too. Sometimes drugs can make accurately diagnosing these other problems complicated. Adolescents may begin taking drugs to deal with depression or anxiety, for example; on the other hand, frequent drug use may also cause or precipitate those disorders. Adolescents entering drug abuse treatment should be given a comprehensive mental health screening to determine if other disorders are present. Effectively treating a substance use disorder requires addressing drug abuse and other mental health problems simultaneously.

If an adolescent starts behaving differently for no apparent reason—such as acting withdrawn, frequently tired or depressed, or hostile—it could be a sign he or she is developing a drug-related problem. Parents and others may overlook such signs, believing them to be a normal part of puberty.

Other signs include:

- a change in peer group
- carelessness with grooming
- decline in academic performance
- missing classes or skipping school
- loss of interest in favorite activities
- changes in eating or sleeping habits
- deteriorating relationships with family members and friends

Parents tend to underestimate the risks or seriousness of drug use. The symptoms listed here suggest a problem that may already have become serious and should be evaluated to determine the underlying cause—which could be a substance abuse problem or another mental health or medical disorder. Parents who are unsure whether their child is abusing drugs can enlist the help of a primary care physician, school guidance counselor, or drug abuse treatment provider.

Adolescent girls and boys may have different developmental and social issues that may call for different treatment strategies or emphases. For example, girls with substance use disorders may be more likely to also have mood disorders such as depression or to have experienced physical or sexual abuse. Boys with substance use disorders are more likely to also have conduct, behavioral, and learning problems, which may be very disruptive to their school, family, or community. Treatments should take into account the higher rate of internalizing and stress disorders among adolescent girls, the higher rate of externalizing disruptive disorders and juvenile justice problems among adolescent boys, and other gender differences that may play into adolescent substance use disorders.

Treatment providers are urged to consider the unique social and environmental characteristics that may influence drug abuse and treatment for racial/ethnic minority adolescents, such as stigma, discrimination, and sparse community resources. With the growing number of immigrant children living in the United States, issues of culture of origin, language, and acculturation are important considerations for treatment. The demand for bilingual treatment providers to work with adolescents and their families will also be increasing as the diversity of the U.S. population increases.

Below are the 13 principles that NIDA recommends for dealing with adolescent substance use:

- 1. Adolescent substance use needs to be identified and addressed as soon as possible.** Drugs can have long-lasting effects on the developing brain and may interfere with family, positive peer relationships, and school performance. Most adults who develop a substance use disorder report having started drug use in adolescence or young adulthood, so it is important to identify and intervene in drug use early.
- 2. Adolescents can benefit from a drug abuse intervention even if they are not addicted to a drug.**¹⁸ Substance use disorders range from problematic use to addiction and can be treated successfully at any stage, and at any age. For young people, any drug use (even if it seems like only “experimentation”), is cause for concern, as it exposes them to dangers from the drug and associated risky behaviors and may lead to more drug use in the future. Parents and other adults should monitor young people and not underestimate the significance of what may appear as isolated instances of drug-taking.
- 3. Routine annual medical visits are an opportunity to ask adolescents about drug use.** Standardized screening tools are available to help pediatricians, dentists, emergency room doctors, psychiatrists, and other clinicians determine an adolescent’s level of involvement (if any) in tobacco, alcohol, and illicit and nonmedical prescription drug use.¹⁹ When an adolescent reports substance use, the health care provider can assess its severity and either provide an onsite brief intervention or refer the teen to a substance abuse treatment program.^{20, 21}
- 4. Legal interventions and sanctions or family pressure may play an important role in getting adolescents to enter, stay in, and complete treatment.** Adolescents with substance use disorders rarely feel they need treatment and almost never seek it on their own. Research shows that treatment can work even if it is mandated or entered into unwillingly.²²
- 5. Substance use disorder treatment should be tailored to the unique needs of the adolescent.** Treatment planning begins with a comprehensive assessment to identify the person’s strengths and weaknesses to be addressed. Appropriate treatment considers an adolescent’s level of psychological development, gender, relations with family and peers, how well he or she is doing in school, the larger community, cultural and ethnic factors, and any special physical or behavioral issues.
- 6. Treatment should address the needs of the whole person, rather than just focusing on his or her drug use.** The best approach to treatment includes supporting the adolescent’s larger life needs, such as those related to medical, psychological, and social well-being, as well as housing, school, transportation, and legal services. Failing to address such needs simultaneously could sabotage the adolescent’s treatment success.
- 7. Behavioral therapies are effective in addressing adolescent drug use.** Behavioral therapies, delivered by trained clinicians, help an adolescent stay off drugs by strengthening his or her motivation to change. This can be done by providing incentives for abstinence, building skills to resist and refuse substances and deal with triggers or craving, replacing drug use with constructive and rewarding activities, improving problem-solving skills, and facilitating better interpersonal relationships.
- 8. Families and the community are important aspects of treatment.** The support of family members is important for an adolescent’s recovery. Several evidence-based interventions for adolescent drug abuse seek to strengthen family relationships by improving communication and improving family members’ ability to support abstinence from drugs. In addition, members of the community (such as school counselors, parents, peers, and mentors) can encourage young people who need help to get into treatment—and support them along the way.

9. **Effectively treating substance use disorders in adolescents requires also identifying and treating any other mental health conditions they may have.** Adolescents who abuse drugs frequently also suffer from other conditions including depression, anxiety disorders, attention-deficit hyperactivity disorder (ADHD), oppositional defiant disorder, and conduct problems.²³ Adolescents who abuse drugs, particularly those involved in the juvenile justice system, should be screened for other psychiatric disorders. Treatment for these problems should be integrated with the treatment for a substance use disorder.
10. **Sensitive issues such as violence and child abuse or risk of suicide should be identified and addressed.** Many adolescents who abuse drugs have a history of physical, emotional, and/or sexual abuse or other trauma.²⁴ If abuse is suspected, referrals should be made to social and protective services, following local regulations and reporting requirements.
11. **It is important to monitor drug use during treatment.** Adolescents recovering from substance use disorders may experience relapse, or a return to drug use. Triggers associated with relapse vary and can include mental stress and social situations linked with prior drug use. It is important to identify a return to drug use early before an undetected relapse progresses to more serious consequences. A relapse signals the need for more treatment or a need to adjust the individual's current treatment plan to better meet his or her needs.
12. **Staying in treatment for an adequate period of time and continuity of care afterward are important.** The minimal length of drug treatment depends on the type and extent of the adolescent's problems, but studies show outcomes are better when a person stays in treatment for 3 months or more.²⁵ Because relapses often occur, more than one episode of treatment may be necessary. Many adolescents also benefit from continuing care following treatment,²⁶ including drug use monitoring, follow-up visits at home,²⁷ and linking the family to other needed services.
13. **Testing adolescents for sexually transmitted diseases like HIV, as well as hepatitis B and C, is an important part of drug treatment.** Adolescents who use drugs—whether injecting or non-injecting—are at an increased risk for diseases that are transmitted sexually as well as through the blood, including HIV and hepatitis B and C. All drugs of abuse alter judgment and decision making, increasing the likelihood that an adolescent will engage in unprotected sex and other high-risk behaviors including sharing contaminated drug injection equipment and unsafe tattooing and body piercing practices—potential routes of virus transmission. Substance use treatment can reduce this risk both by reducing adolescents' drug use (and thus keeping them out of situations in which they are not thinking clearly) and by providing risk-reduction counseling to help them modify or change their high-risk behaviors.^{28,29}

Let's Talk About It... If you were to develop either a prevention program or a treatment program specifically for adolescents, what approach would you use? What kinds of tools or information would you want to be part of the program?

Understanding Adolescent Drug Use

Addiction has been referred to as a disease of youth. For most who develop a substance use disorder, their use started as a teen or young adult. Rarely do we see a person whose addiction began during later years in life. Simply look at the statistics and we can see why this is thought to be true. According to the National Center for Drug Abuse Statistics (n.d.), 86% of teens report knowing someone who smokes, drinks, or uses drugs during the school day, 50% report having misused a drug at least once in their lifetime, and 43% of college students report using illicit drugs.

In adolescence, young people experience profound changes, both physically and emotionally. Adolescence bridges the gap between childhood and adulthood. Young people attempt to gain independence while still being dependent on caregivers. Despite their desire for independence and autonomy, they feel a competing need to conform to their peers. It is a time of self-discovery and trying to answer the question, "Who am I?" in relation to their families, their peers, and society as a whole.

Have you ever known a teen (or had one of your own) who made a decision or engaged in a behavior that led you to question, *What were they thinking?!* The answer is quite simple. Teens don't *think*. They *feel*. What do you mean, you may ask? This is because teens process information with the amygdala, an area of the brain tied to the ability to experience emotions. Research has shown that the prefrontal cortex, the area of the brain that is involved in executive functions including reasoning, judgment, and decision-making, develops during adolescence but doesn't fully mature until the age of 25 years. Thus, as the brain of an adolescent is processing incoming stimuli with the amygdala, it doesn't have the ability to use executive functions. Add the use of alcohol and drugs to the developing brain and the result is changes in neuropsychological functioning. To the lay person this includes such things as lower educational achievement, changes in cognitive functioning, and poorer verbal and visual learning and memory.

Alcohol and drug use are often considered rites of passage for adolescents and experimentation is common. We by no means want to give the impression that the use of drugs and alcohol by teens isn't something to be concerned about. Of course it is. However,

just because teens may experiment with drugs and/or alcohol doesn't mean they will develop an addiction. Also, a relatively large percentage of adolescents don't drink or use, a fact that is often overlooked.

Current Trends

Given the amount of information we are bombarded with regarding drug and alcohol use via various forms of media, you might think adolescent use is at an all time high. Our answer would be to say that it depends. It depends on such things as risk and protective factors for each individual and it also depends on the type of drug. According to the National Institute on Drug Abuse's (NIH) annual survey of 8th, 10th, and 12th graders for 2019, use of cannabis remains steady, but use of illicit substances other than cannabis has declined steadily since 1997. The use of prescription opiates has declined for all three age groups. Abuse of medications used to treat ADHD has declined over the last 5 years for 10th and 12th graders, but has increased for 8th graders. Both cigarette smoking and use of alcohol has also decreased. One area that has increased exponentially from 2018 to 2019 for all three age groups is vaping, including both nicotine and cannabis.



A YouTube element has been excluded from this version of the text. You can view it online here: <https://cod.pressbooks.pub/addiction/?p=46>

Maturation of the adolescent brain

Mariam Arain, Maliha Haque, Lina Johal, Puja Mathur, Wynand Nel, Afsha Rais, Ranbir Sandhu, and Sushil Sharma.

Abstract

Adolescence is the developmental epoch during which children become adults – intellectually, physically, hormonally, and socially. Adolescence is a tumultuous time, full of changes and transformations. The pubertal transition to adulthood involves both gonadal and behavioral maturation. Magnetic resonance imaging studies have discovered that myelinogenesis, required for proper insulation and efficient neurocybernetics, continues from childhood and the brain's region-specific neurocircuitry remains structurally and functionally vulnerable to impulsive sex, food, and sleep habits. The maturation of the adolescent brain is also influenced by heredity, environment, and sex hormones (estrogen, progesterone, and testosterone), which play a crucial role in myelination. Furthermore, glutamatergic neurotransmission predominates, whereas gamma-aminobutyric acid neurotransmission remains under construction, and this might be responsible for immature and impulsive behavior and neurobehavioral excitement during adolescent life. The adolescent population is highly vulnerable to driving under the influence of alcohol and social maladjustments due to an immature limbic system and prefrontal cortex. Synaptic plasticity and the release of neurotransmitters may also be influenced by environmental neurotoxins and drugs of abuse including cigarettes, caffeine, and alcohol during adolescence. Adolescents may become involved with offensive crimes, irresponsible behavior, unprotected sex, juvenile courts, or even prison. According to a report by the Centers for Disease Control and Prevention, the major cause of death among the teenage population is due to injury and violence related to sex and substance abuse. Prenatal neglect, cigarette smoking, and alcohol consumption may also significantly impact maturation of the adolescent brain. Pharmacological interventions to regulate adolescent behavior have been attempted with limited success. Since several factors, including age, sex, disease, nutritional status, and substance abuse have a significant impact on the maturation of the adolescent brain, we have highlighted the influence of these clinically significant and socially important aspects in this report.

Keywords: myelinogenesis, neurocircuitry, molecular imaging, drug addiction, behavior, social adjustment

Introduction

Significant progress has been made over the last 25 years in understanding the brain’s regional morphology and function during adolescence. It is now realized that several major morphological and functional changes occur in the human brain during adolescence.¹ Molecular imaging and functional genomics studies have indicated that the brain remains in an active state of development during adolescence.¹ In particular, magnetic resonance imaging (MRI) studies have discovered that myelinogenesis continues and the neurocircuitry remains structurally and functionally vulnerable to significant increases in sex hormones (estrogen, progesterone, and testosterone) during puberty which, along with environmental input, influences sex, eating, and sleeping habits. Particularly significant changes occur in the limbic system, which may impact self-control, decision making, emotions, and risk-taking behaviors. The brain also experiences a surge of myelin synthesis in the frontal lobe, which is implicated in cognitive processes during adolescence.¹

Brain maturation during adolescence (ages 10–24 years) could be governed by several factors, as illustrated in Figure 1. It may be influenced by heredity and environment, prenatal and postnatal insult, nutritional status, sleep patterns, pharmacotherapy, and surgical interventions during early childhood. Furthermore, physical, mental, economical, and psychological stress; drug abuse (caffeine, nicotine, and alcohol); and sex hormones including estrogen, progesterone, and testosterone can influence the development and maturation of the adolescent brain. MRI studies have suggested that neurocircuitry and myelinogenesis remain under construction during adolescence because these events in the central nervous system (CNS) are transcriptionally regulated by sex hormones that are specifically increased during puberty.

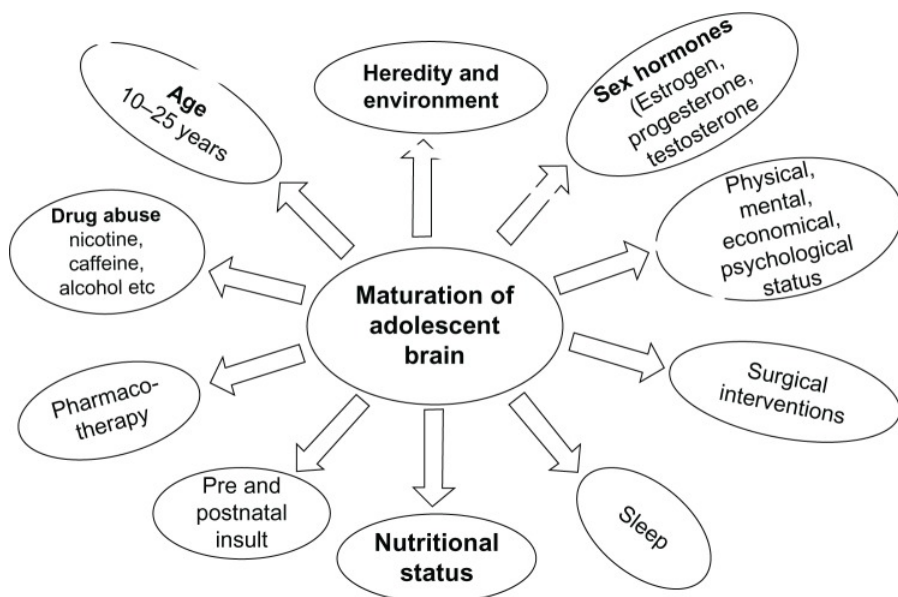


Figure 1

Factors influencing adolescent brain maturation.

Notes: Brain maturation is influenced by heredity and environment, prenatal and postnatal insult, nutritional status, sleep patterns, pharmacotherapy, and surgical interventions during early childhood. Furthermore, physical, mental, economical, and psychological stress; drug abuse (caffeine, nicotine, and ethanol); and sex hormones, including estrogen, progesterone, and testosterone influence the development and maturation of the adolescent brain. MRI studies have suggested that neurocircuitry and myelinogenesis remain under construction during adolescence because these events in the CNS depend on sex hormones that are specifically increased during puberty.

Abbreviations: CNS, central nervous system; MRI, magnetic resonance imaging.

Neurobehavioral, morphological, neurochemical, and pharmacological evidence suggests that the brain remains under construction during adolescence,^{1,2,3,7,12,21,22,23,27,49} as illustrated in Figure 2. Thus, the consolidation of neurocybernetics occurs during adolescence by the maturation of neurocircuitry and myelination. Although tubulinogenesis, axonogenesis, and synaptogenesis may be accomplished during prenatal and immediate postnatal life, myelinogenesis remains active during adolescent life. Neurochemical evidence suggests that glutamatergic neurotransmission is accomplished during prenatal and immediate postnatal life while gamma-aminobutyric acid (GABA)ergic neurotransmission, particularly in the prefrontal cortex, remains under construction during adolescence.² Hence, delayed development of GABAergic neurotransmission is held responsible for neurobehavioral excitement including euphoria and risk-taking behavior, whereas dopaminergic (DA)ergic neurotransmission,

particularly in the prefrontal area, is developmentally regulated by sex hormones and is implicated in drug-seeking behavior during adolescence;³ thus, brain development in critical areas is an ongoing process during adolescence. Indeed, adolescents are risk-taking and novelty-seeking individuals and they are more likely to weigh positive experiences more heavily and negative experiences less so than adults. This behavioral bias can lead to engagement in risky activities like reckless driving, unprotected sex, and drug abuse.¹⁻³ In fact, most drug addictions initiate during adolescence, and early drug abuse is usually associated with an increased incidence of physical tolerance and dependence. The hormonal changes in puberty contribute to physical, emotional, intellectual, and social changes during adolescence. These changes do not just induce maturation of reproductive function and the emergence of secondary sex characteristics, but they also contribute to the appearance of sex differences in nonreproductive behaviors. Physical changes, including accelerated body growth, sexual maturation, and development of secondary sexual characteristics occur simultaneously along with social, emotional, and cognitive development during adolescence. Furthermore, the adolescent brain evolves its capability to organize, regulate impulses, and weigh risks and rewards; however, these changes can make adolescents highly vulnerable to risk-taking behavior. Thus, brain maturation is an extremely important aspect of overall adolescent development, and a basic understanding of the process might aid in the understanding of adolescent sexual behavior, pregnancy, and intellectual performance issues.

Maturation of adolescent brain (consolidation of brain regional neurocybernetics)

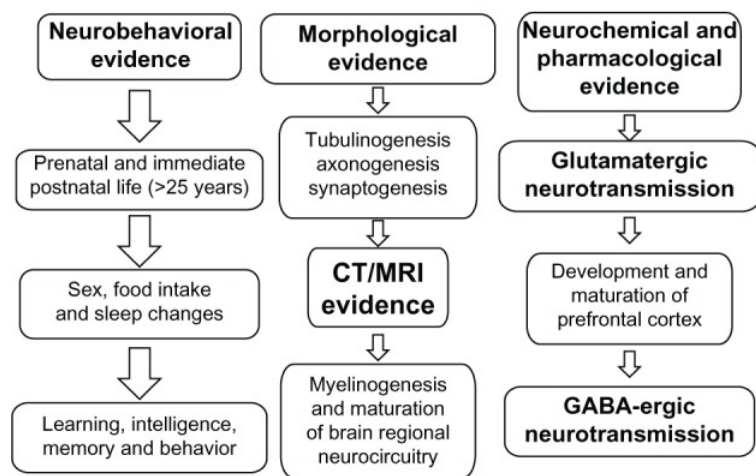


Figure 2

A diagram illustrating various stages of human brain development.

Notes: Several neurobehavioral, morphological, neurochemical, and pharmacological evidences suggest that the brain remains under construction during adolescence.^{1,2,3,7,12,21,22,23,25,42} Tubulinogenesis, axonogenesis, and synaptogenesis may be accomplished during prenatal and immediate postnatal life, yet myelinogenesis remains active during adolescent life. Furthermore, glutamatergic neurotransmission is accomplished during prenatal and immediate postnatal life, while GABAergic neurotransmission in the prefrontal cortex remains under construction. Delayed development of GABAergic neurotransmission among adolescents is implicated in neurobehavioral excitement and risk-taking behavior.

Abbreviations: CT, computed tomography; GABAergic, gamma amino butyric acid ergic; MRI, magnetic resonance imaging.

There are several other crucial developmental aspects of adolescence that are associated with changes in physical, cognitive, and psychosocial characteristics, as well as with attitudes toward intimacy and independence, and these may also influence brain maturation; these will also be discussed in the present report. Furthermore, we emphasize the deleterious effects of drug abuse and the clinical significance of nutrition from fish oils and fatty acids in adolescent brain maturation.

Go to:

Neuronal plasticity and neurocircuitry

The term “plasticity” refers to the possible significant neuronal changes that occur in the acquisition of new skills.¹⁻³ These skills initiate the process of elaboration and stabilization of synaptic circuitry as part of the learning process. Plasticity permits adolescents to learn and adapt in order to acquire independence; however, plasticity also increases an individual’s vulnerability toward making improper decisions because the brain’s region-specific neurocircuitry remains under construction, thus making it

difficult to think critically and rationally before making complex decisions. Moreover, the neurocircuitry may be forged, refined or weakened, and damaged during plasticity. Thus, neuronal proliferation, rewiring, dendritic pruning, and environmental exposure are important components of brain plasticity during adolescence. A significant portion of brain growth and development occurring in adolescence is the construction and strengthening of regional neurocircuitry and pathways; in particular, the brain stem, cerebellum, occipital lobe, parietal lobe, frontal lobe, and temporal lobe actively mature during adolescence. The frontal lobes are involved in movement control, problem solving, spontaneity, memory, language, initiation, judgment, impulse control, and social and sexual behavior. Furthermore, the prefrontal cortex, which is implicated in drug-seeking behavior, remains in a process of continuous reconstruction, consolidation, and maturation during adolescence.

[Go to:](#)

The adolescent brain

It is well established that various morphological and physiological changes occur in the human brain during adolescence. The term “adolescence” is generally used to describe a transition stage between childhood and adulthood. “Adolescence” also denotes both teenage years and puberty, as these terms are not mutually exclusive. The second surge of synaptogenesis occurs in the brain during the adolescent years. Hence, adolescence is one of the most dynamic events of human growth and development, second only to infancy in terms of the rate of developmental changes that can occur within the brain. Although there is no single definition of adolescence or a set age boundary, Kaplan⁴ has pointed out that puberty refers to the hormonal changes that occur in early youth, and adolescence may extend well beyond the teenage years. In fact, there are characteristic developmental changes that almost all adolescents experience during their transition from childhood to adulthood. It is well established that the brain undergoes a “rewiring” process that is not complete until approximately 25 years of age.⁵ This discovery has enhanced our basic understanding regarding adolescent brain maturation and it has provided support for behaviors experienced in late adolescence and early adulthood. Several investigators consider the age span 10–24 years as adolescence, which can be further divided into substages specific to physical, cognitive, and social–emotional development.^{5,6} Hence, understanding neurological development in conjunction with physical, cognitive, and social–emotional adolescent development may facilitate the better understanding of adolescent brain maturation, which can subsequently inform proper guidance to adolescents.⁷

Longitudinal MRI studies have confirmed that a second surge of neuronal growth occurs just before puberty.^{1,7} This surge is similar to that noticed during infancy and consists of a thickening of the grey matter. Following neuronal proliferation, the brain rewires itself from the onset of puberty up until 24 years old, especially in the prefrontal cortex. The rewiring is accomplished by dendritic pruning and myelination. Dendritic pruning eradicates unused synapses and is generally considered a beneficial process, whereas myelination increases the speed of impulse conduction across the brain’s region-specific neurocircuitry. The myelination also optimizes the communication of information throughout the CNS and augments the speed of information processing. Thus, dendritic pruning and myelination are functionally very important for accomplishing efficient neurocybernetics in the adolescent brain.

During adolescence, the neurocircuitry strengthens and allows for multitasking, enhanced ability to solve problems, and the capability to process complex information. Furthermore, adolescent brain plasticity provides an opportunity to develop talents and lifelong interests; however, neurotoxic insult, trauma, chronic stress, drug abuse, and sedentary lifestyles may have a negative impact during this sensitive period of brain maturation.^{8,9}

Out of several neurotransmitters in the CNS, three play a significant role in the maturation of adolescent behavior: dopamine, serotonin, and melatonin.^{3,8,9} Dopamine influences brain events that control movement, emotional response, and the ability to experience pleasure and pain. Its levels decrease during adolescence, resulting in mood swings and difficulties regulating emotions. Serotonin plays a significant role in mood alterations, anxiety, impulse control, and arousal. Its levels also decrease during adolescence, and this is associated with decreased impulse control. Lastly, melatonin regulates circadian rhythms and the sleep–wake cycle. The body’s daily production of melatonin increases the requirement for sleep during adolescence.^{8,9}

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Behavioral problems and puberty

It is now known that hormones are not the only explanation for erratic adolescent behavior; hence, investigators are now trying to establish the exact nature of the interrelationship between pubertal processes and adolescent brain maturation. Dahl has explained three main categories of brain changes related to puberty: (1) changes that precede puberty; (2) changes that are the consequence of puberty; and (3) changes that occur after puberty is over.⁹ The timing of these changes may underlie many aspects of risk-taking behavior. These changes, which are the consequence of puberty, occur primarily in the brain regions closely linked to emotions,

arousal, motivation, as well as to appetite and sleep patterns. Brain changes independent of puberty are those related to the development of advanced cognitive functioning.

Animal studies have shown that sex hormones (estrogen, progesterone, and testosterone) are critically involved in myelination.¹² These studies have provided a relationship between sex hormones, white matter, and functional connectivity in the human brain, measured using neuroimaging. The results suggest that sex hormones organize structural connections and activate the brain areas they connect. These processes could underlie a better integration of structural and functional communication between brain regions with age. Specifically, ovarian hormones (estradiol and progesterone) may enhance both corticocortical and subcortical functional connectivity, whereas androgens (testosterone) may decrease subcortical functional connectivity but increase the functional connectivity between subcortical brain areas. Therefore, when examining brain development and aging, or when investigating the possible biological mechanisms of neurological diseases, the contribution of sex hormones should not be ignored.¹⁰

A recent study has described how the social brain develops during adolescence.¹⁰ Adolescence is a time characterized by change – hormonally, physically, psychologically, and socially. Functional MRI studies have demonstrated the developmental changes that occur during adolescence among white matter and grey matter volumes in regions within the “social brain.”^{1,7,12} Activity in the mesolimbic brain regions also showed changes between adolescence and adulthood during social cognition tasks. A developmental clock – along with the signals that provide information on somatic growth, energy balance, and season of the year – times the awakening of gonadotropin-releasing hormone (GnRH) neurons at the onset of puberty. High-frequency GnRH release results in the disinhibition and activation of GnRH neurons at the onset of puberty, leading to gametogenesis and an increase in sex hormone secretion. Sex hormones and adrenocorticotropic hormones both remodel and activate neurocircuits during adolescent brain development, leading to the development of sexual salience of sensory stimuli, sexual motivation, and expression of copulatory behavior. These influences of hormones on reproductive behavior depend on changes in the adolescent brain that occur independently of gonadal maturation. Reproductive maturity is therefore the product of developmentally timed, brain-driven, and recurrent interactions between steroid hormones and the adolescent nervous system.^{11,12}

Limbic system

The limbic system is a group of structures located deep within the cerebrum. It is composed of the amygdala, the hippocampus, and the hypothalamus. These brain regions are involved in the expression of emotions and motivation, which are related to survival. The emotions include fear, anger, and the fight or flight response. The limbic system is also involved in feelings of pleasure that reward behaviors related to species survival, such as eating and sex. In addition, the limbic system regulates functions related to memory storage and retrieval of events that invoke a strong emotional response. Neuroimaging studies have revealed that when interacting with others and making decisions, adolescents are more likely than adults to be swayed by their emotions.^{12–16} In addition, adolescents often read others’ emotions incorrectly. These studies involved comparing a teen brain to an adult brain determined that adolescents’ prefrontal cortices are used less often during interpersonal interactions and decision making than their adult counterparts. In fact, adolescents relied more on the emotional region of their brains when reading others’ emotions, which is more impulsive when compared to a logical or measured interpretation. Thus, an understanding of how the limbic system and the prefrontal cortex are used has provided a partial explanation for certain characteristics of adolescents and adolescent behaviors, such as quickness to anger, intense mood swings, and making decisions on the basis of “gut” feelings. Because adolescents rely heavily on the emotional regions of their brains, it can be challenging to make what adults consider logical and appropriate decisions, as illustrated in [Figure 3](#).

Executive human brain functions

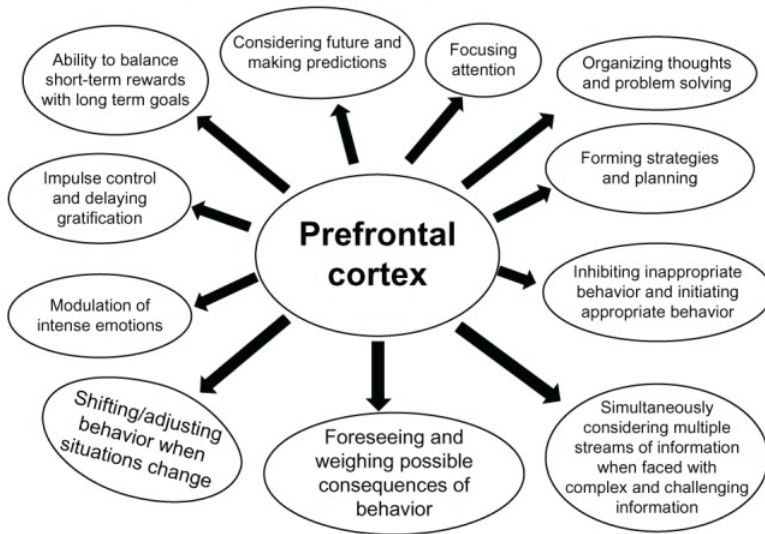


Figure 3

A diagram illustrating the developmental regulation of executive functions by the prefrontal cortex, which remains under construction during adolescence.

Notes: Several executive brain functions are governed by the prefrontal cortex, which remains in a state of active maturation during adolescence. These complex brain functions are regulated by the prefrontal cortex as illustrated in this figure (based on the original discoveries by Geddes and Steinberg).^{1,21–23,25} Due to immature functional areas in the prefrontal cortex, adolescent teens may take part in risk seeking behavior including unprotected sex, impaired driving, and drug addiction.

Prefrontal cortex

Recently, investigators have studied various aspects of the maturation process of the prefrontal cortex of adolescents.^{17,18} The prefrontal cortex offers an individual the capacity to exercise good judgment when presented with difficult life situations. The prefrontal cortex, the part of the frontal lobes lying just behind the forehead, is responsible for cognitive analysis, abstract thought, and the moderation of correct behavior in social situations. The prefrontal cortex acquires information from all of the senses and orchestrates thoughts and actions in order to achieve specific goals.

The prefrontal cortex is one of the last regions of the brain to reach maturation, which explains why some adolescents exhibit behavioral immaturity. There are several executive functions of the human prefrontal cortex that remain under construction during adolescence, as illustrated in Figures 3 and 4.4. The fact that brain development is not complete until near the age of 25 years refers specifically to the development of the prefrontal cortex.¹⁹

Limbic system and sensation seeking behavior among adolescents

(management of emotions and motivation)

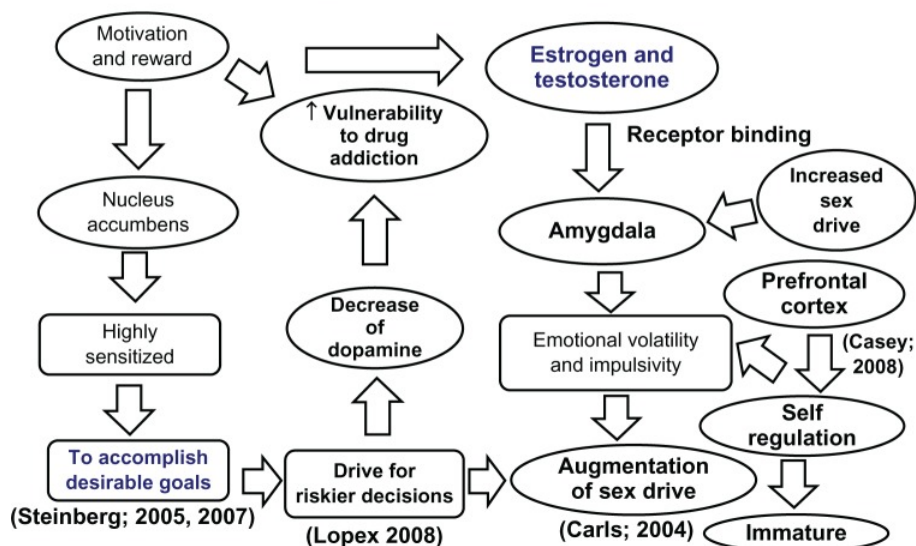


Figure 4

An algorithmic diagram illustrating the management of emotions and motivation by the limbic system in the adolescent brain.

Notes: The nucleus accumbens and amygdala are the two most prominent parts of the central nervous system involved in riskier behavior and increased sex drive among teenage adolescents. The nucleus accumbens is highly sensitized to accomplish desirable goals. A decrease in dopamine in the nucleus accumbens is involved in increased vulnerability to drug addiction and risky decisions. Sex hormones (estrogen and testosterone) bind with their receptors to induce increased sex drive and emotional volatility and impulsivity. Due to an immature prefrontal cortex, adolescents also have an increased sex drive and problems in self-regulation as illustrated in this flow diagram.^{19,23,26,27,54}

MRI studies have discovered that developmental processes tend to occur in the brain in a back-to-front pattern, explaining why the prefrontal cortex develops last. These studies have also shown that teens have less white matter (myelin) in the frontal lobes compared to adults, and that myelin in the frontal lobes increases throughout adolescence.^{1,7,21} With more myelin comes the growth of important neurocircuitry, allowing for better flow of information between brain regions.^{20,21} These findings have led to the concept of frontalization, whereby the prefrontal cortex develops in order to regulate the behavioral responses initiated by the limbic structures. During adolescence, white matter increases in the corpus callosum, the bundle of nerve fibers connecting the right and left hemispheres of the brain, which allows for efficient communication between the hemispheres and enables an individual to access a full array of analytical and creative strategies to respond to complex dilemmas that may arise in adolescent life. Hence, the role of experience is critical in developing the neurocircuitry that allows for increased cognitive control of the emotions and impulses of adolescence. Adolescents, who tend to engage in risky behaviors in relatively safe environments, utilize this circuitry and develop the skills to tackle more dangerous situations; however, with an immature prefrontal cortex, even if adolescents understand that something is dangerous, they may still engage in such risky behavior.²¹

Risk-taking behavior

The exact biological basis of risk-taking behavior in adolescents remains enigmatic. Adolescents are at their peak of physical strength, resilience, and immune function, yet mortality rates among 15–24 year-olds are more than triple the mortality rates of middle school children. The Centers for Disease Control and Prevention has identified the leading causes of death and illness among adolescents,^{22,23,59} as illustrated in Figure 5. It is generally held that adolescents take risks to test and define themselves, as risk-taking can be both beneficial and harmful. It can lead to situations where new skills are learned and new experiences can prepare them for future challenges in their lives. Risk-taking serves as a means of discovery about oneself, others, and the world at large. The proclivity for risk-taking behavior plays a significant role in adolescent development, rendering this a period of time for both accomplishing their full potential and vulnerability. Hence, acquiring knowledge regarding adolescent brain maturation can help understand why teens take risks, while keeping in mind that risk-taking behavior is a normal and necessary component of

adolescence. This knowledge may help in developing physiologically and pharmacologically effective interventions that focus on reducing the negative consequences associated with risk-taking behavior among the adolescent population.²²

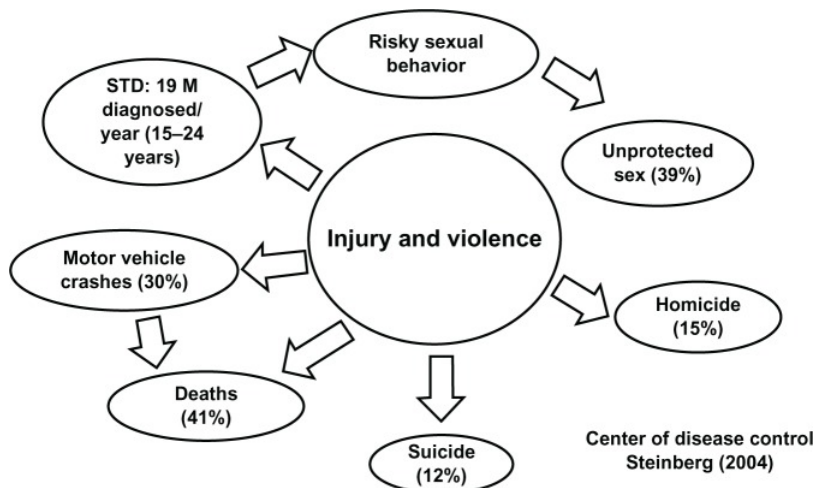


Figure 5

Leading cause of death among adolescents (10–24 years).

Notes: Injury and violence are the two most common leading causes of death during adolescence. Out of 19 million adolescents (15–24 years) in the US that were diagnosed with HIV/AIDS, 39% admitted that they had unprotected sex. In addition to risky sex behavior, 30% of adolescents had been involved in motor vehicle accidents, with 41% of these linked to deaths; 12% committed suicide; and 15% were victims of homicide as illustrated in this figure (Steinberg 2004, Centers for Disease Control and Prevention).¹⁸

Abbreviations: AIDS, acquired immune deficiency syndrome; HIV, human immunodeficiency virus; M, million; STD, sexually transmitted disease.

Risk perception

It has been established that, around the age of 12 years, adolescents decrease their reliance on concrete thinking and begin to show the capacity for abstract thinking, visualization of potential outcomes, and a logical understanding of cause and effect.²³ Teens begin looking at situations and deciding whether they are safe, risky, or dangerous. These aspects of development correlate with the maturation of the frontal lobe, and is marked by a shift from the development of additional neural connections to synaptic pruning, as well as by an increase in the release of hormones, all of which drive an adolescent’s mood and impulsive behavior.

By the age of 15 years, there is little difference in adolescents’ and adults’ decision-making patterns pertaining to hypothetical situations. Teens were found to be capable of reasoning about the possible harm or benefits of different courses of action; however, in the real world, teens still engaged in dangerous behaviors, despite understanding the risks involved.^{22,23,59} Hence, both the role of emotions and the connection between feeling and thinking need to be considered while studying the way teens make decisions.

Investigators have differentiated between “hot” cognition and “cold” cognition.²⁴ Hot cognition is described as thinking under conditions of high arousal and intense emotion. Under these conditions, teens tend to make poorer decisions. The opposite of hot cognition is cold cognition, which is critical and over-analyzing.²⁵ In cold cognition, circumstances are less intense and teens tend to make better decisions. Then, with the addition of complex feelings – such as fear of rejection, wanting to look cool, the excitement of risk, or anxiety of being caught – it is more difficult for teens to think through potential outcomes, understand the consequences of their decisions, or even use common sense.²⁶ The apparent immaturity of the connections between the limbic system, prefrontal cortex, and the amygdala provides further support for this concept.

Sensation seeking

The nucleus accumbens, a part of the brain’s reward system located within the limbic system, is the area that processes information related to motivation and reward. Brain imaging has shown that the nucleus accumbens is highly sensitive in adolescents, sending out impulses to act when faced with the opportunity to obtain something desirable.²⁷ For instance, adolescents are more vulnerable to nicotine, alcohol, and other drug addictions because the limbic brain regions that govern impulse and motivation are not yet fully developed.²⁸ During puberty, the increases in estrogen and testosterone bind receptors in the limbic system, which not only

stimulates sex drive, but also increases adolescents' emotional volatility and impulsivity. Changes in the brain's reward sensitivity that occur during puberty have also been explored. These changes are related to decreases in DA, a neurotransmitter that produces feelings of pleasure.²⁹ Due to these changes, adolescents may require higher levels of DAergic stimulation to achieve the same levels of pleasure/reward, driving them to make riskier decisions.

Self-regulation

Self-regulation has been broadly classified as the management of emotions and motivation.³⁰ It also involves directing and controlling behavior in order to meet the challenges of the environment and to work toward a conscious purpose. Self-regulation also entails controlling the expression of intense emotions, impulse control, and delayed gratification. As adolescents progress toward adulthood with a body that is almost mature, the self-regulatory parts of their brains are still maturing. An earlier onset of puberty increases the window of vulnerability for teens, making them more susceptible to taking risks that affect their health and development over a prolonged period.³¹

Behavioral control requires a great involvement of cognitive and executive functions. These functions are localized in the prefrontal cortex, which matures independent of puberty and continues to evolve up until 24 years of age. It has been suggested that, during this period, adolescents should not be overprotected, but be allowed to make mistakes, learn from their own experiences, and practice self-regulation. Parents and teachers can help adolescents through this period by listening and offering support and guidance.

Recently, Steinberg studied risk-taking behavior in teens and how this was influenced by their peers.³² He used a driving simulation game in which he studied teens deciding on whether or not to run a yellow light, and found that when teens were playing alone they made safer decisions, but in the presence of friends they made riskier decisions. When teens find themselves in emotionally arousing situations, with their immature prefrontal cortices, hot cognitive thinking comes into play, and these adolescents are more likely to take riskier actions and make impulsive decisions.

Societal influences

Mass media, community, and adult role models can also influence adolescent risk-taking behaviors. Teens are constantly exposed to emotionally arousing stimuli through multimedia, which encourages unprotected sex, substance abuse, alcohol abuse, and life-threatening activities.^{32,33} Even neighborhoods, friends, and communities provide teens with opportunities to engage in risky behaviors, although local law enforcement authorities regulate the purchase of cigarettes, access to and acceptability of guns, and the ability to drive cars. Even adults can have trouble resisting engaging in some of these risky behaviors; however, the temptation must be much harder for teens, whose judgment and decision-making skills are still developing.³⁴

Recent functional MRI studies have demonstrated the extent of development during adolescence in the white matter and grey matter regions within the social brain. Activity in some of these regions showed changes between adolescence and adulthood during social cognition tasks. These studies have provided evidence that the concept of mind usage remains developing late in adolescence.^{1,21,33}

Substance abuse

The mechanisms underlying the long-term effects of prenatal substance abuse and its consequent elevated impulsivity during adolescence are poorly understood. Liu and Lester³⁴ have reported on developmentally-programmed neural maturation and highlighted adolescence as a critical period of brain maturation. These investigators have studied impairments in the DAergic system, the hypothalamic–pituitary–adrenal axis, and the pathological interactions between these two systems that originate from previous fetal programming in order to explain insufficient behavioral inhibition in affected adolescents. In addition, Burke³⁵ has examined the development of brain functions and the cognitive capabilities of teenagers. Specifically, these two sets of investigators have explored the effect of alcohol abuse on brain development, and the fundamental cognitive differences between adolescents and adults, and have suggested that the adultification of youth is harsh for those whose brains have not fully matured.

Cannabis

Cannabis is the most commonly consumed drug among adolescents, and its chronic use may affect maturational refinement by disrupting the regulatory role of the endocannabinoid system.³⁶ Adolescence represents a critical period for brain development and the endocannabinoid system plays a critical role in the regulation of neuronal refinement during this period. In animals, adolescent cannabinoid exposure caused long-term impairment in specific components of learning and memory, and differentially affected emotional reactivity with milder effects on anxiety behavior and more pronounced effects on depressive behavior.³⁷ Epidemiological studies have suggested that adolescent cannabis abuse may increase their risk of developing cognitive

abnormalities, psychotic illness, mood disorders, and other illicit substance abuse later in life.^{36,38–40} Cannabis abuse in adolescence could increase the risk of developing psychiatric disorders, especially in people who are vulnerable to developing psychiatric syndromes. So far, only a few studies have investigated the neurobiological substrates of this vulnerability;⁵⁶ hence, further investigation is required to clarify the molecular mechanisms underlying the effect of cannabis on the adolescent brain.

Nicotine

Recent studies have provided a neural framework to explain the developmental differences that occur within the mesolimbic pathway based on the established role of DA in addiction.^{41,42} During adolescence, excitatory glutamatergic systems that facilitate DAergic neurotransmission are overdeveloped, whereas inhibitory GABAergic systems remain underdeveloped. DAergic pathways originate in the ventral tegmental area and terminate in the nucleus accumbens, where dopamine is increased by nicotine, but decreased during withdrawal. Thus, it has been hypothesized that adolescents display enhanced nicotine reward and reduced withdrawal via enhanced excitation and reduced inhibition of ventral tegmental area cell bodies that release DA in the nucleus accumbens.^{44,45} Although this framework focuses on both adolescents and adults, it may also apply to the enhanced vulnerability to nicotine in adults that were previously exposed to nicotine during adolescence, suggesting that the diagnostic criteria developed for nicotine dependence in adults (based primarily on withdrawal) may be inappropriate during adolescence, when nicotine withdrawal does not appear to play a major role in nicotine use.³⁹ Furthermore, treatment strategies involving nicotine replacement may be harmful for adolescents because it may cause enhanced vulnerability to nicotine dependence later in adulthood. Adolescents that initiate tobacco abuse are more vulnerable to long-term nicotine dependence. A unifying hypothesis has been proposed based on animal studies, and it suggests that adolescents (as compared to adults) experience enhanced short-term positive effects and reduced adverse effects toward nicotine, and they also experience fewer negative effects during nicotine withdrawal.³⁹ Thus, during adolescence, the strong positive effects associated with nicotine are inadequately balanced by the negative effects that contribute to nicotine dependence in adults.

Alcohol

Recently, the development of brain functions, the cognitive capabilities of adolescents, and the effect of alcohol abuse on brain maturation have been examined.^{49,50} Cognitive differences between adolescents and adults suggest that the adultification of youths is deleterious for youths whose brains have not fully matured. Adolescence is the time during which most individuals first experience alcohol exposure, and binge drinking is very common during this period.^{29,50,43} There is increasing evidence for long-lasting neurophysiological changes that may occur following exposure to ethanol during adolescence in animal models.⁵⁰ If alcohol exposure is neurotoxic to the developing brain during adolescence, then understanding how ethanol affects the developing adolescent brain becomes a major public health issue. Adolescence is a critical time period when cognitive, emotional, and social maturation occurs and it is likely that ethanol exposure may affect these complex processes. During a period that corresponds to adolescence in rats, the relatively brief exposure to high levels of alcohol via ethanol vapors caused long-lasting changes in functional brain activity.⁵¹ The following observations were recorded: disturbances in waking electroencephalography; a reduction in the P3 wave (P3a and P3b) component of event-related potential measurements; reductions in the mean duration of slow-wave sleep; and the total amount of time spent in slow-wave sleep – findings that are consistent with the premature sleep patterns observed during aging.⁵⁰

Sex differences

Sex differences in many behaviors, including drug abuse, have been attributed to social and cultural factors.^{43,46} A narrowing gap in drug abuse between adolescent boys and girls supports this hypothesis;⁵² however, some sex differences in addiction vulnerability reflect biologic differences in the neurocircuits involved in addiction. A male predominance in overall drug abuse appears by the end of adolescence, while girls develop a rapid progression from the time of the first abuse to dependence, and this represents female-based vulnerability. Recent studies have emphasized the contribution of sex differences in the function of the ascending DAergic systems, which are critical in reinforcement.^{3,43} These studies highlight the behavioral, neurochemical, and anatomical changes that occur in the DAergic functions that are related to the addictions that occur during adolescence. In addition, these studies have presented novel findings about the emergence of sex differences in DAergic function during adolescence.^{43,46–48} Sex differences in drinking patterns and the rates of alcohol abuse and dependence begin to emerge during the transition from late puberty to young adulthood. Increases in pubertal hormones, including gonadal and stress hormones, are a prominent developmental feature of adolescence and could contribute to the progression of sex differences in alcohol drinking behavior during puberty. Witt⁴⁶ reviewed experimental and correlational studies of gonadal and stress-related hormone changes, as well as their effects on alcohol consumption and the associated neurobehavioral actions of alcohol on the mesolimbic dopaminergic system. Mechanisms have been suggested by which reproductive and stress-related hormones may modulate neural circuits within

the brain reward system, and these hormones may produce sex differences in terms of alcohol consumption patterns and adolescents' vulnerability to alcohol abuse and dependence, which become apparent during the late pubertal period.

Chemotherapy

Recently, Vázquez et al⁵³ emphasized the need for the early and accurate diagnosis of CNS complications during and after pediatric cancer treatment because of the improvement in overall survival rates related to innovative and aggressive oncologic therapies. A major concern in this issue is recognizing the radiologic features of these CNS complications. Radiologists are supposed to be familiar with the early and late effects of cancer therapy in the pediatric CNS (toxic effects, infection, endocrine or sensory dysfunction, neuropsychological impairment, and secondary malignancies) in order to provide an accurate diagnosis and to minimize morbidity. The acquisition of further knowledge about these complications will enable the development of more appropriate therapeutic decisions, effective patient surveillance, and an improved quality of life by decreasing the long-term consequences in survivors. Certain chemotherapeutic compounds and environmental agents, such as anesthetics, antiepileptics, sleep-inducing and anxiolytic compounds, nicotine, alcohol, and stress, as well as agents of infection have also been investigated quite extensively and have been shown to contribute to the etiopathogenesis of serious neuropsychiatric disorders.⁵⁴ All of these agents have a deleterious influence on developmental processes during the time when the brain experiences major changes in early childhood and during adulthood. Several of these agents have contributed to the structural and functional brain abnormalities that have been observed in the biomarker profiles of schizophrenia and fetal alcohol syndrome. The effects of these agents are generally permanent and irreversible.⁵⁴

Nutrition

The rapid expansion of knowledge in this field, from basic science to clinical and community-based research, is expected to lead to urgently needed research in support of effective, evidence-based medicine and treatment strategies for undernutrition, overnutrition, and eating disorders in early childhood. Eating is necessary for survival and provides a sense of pleasure, but may be perturbed, leading to undernutrition, overnutrition, and eating disorders. The development of feeding in humans relies on the complex interplay between homeostatic mechanisms; neural reward systems; and adolescents' motor, sensory, and emotional capabilities. Furthermore, parenting, social factors, and food influence the development of eating behavior.

Recently, the neural development of eating behavior in children has been investigated.⁵⁵ Furthermore, developmentally programmed neural maturation has been discussed in order to highlight adolescence as the second most critical period of brain maturation.⁵⁶ These studies used impairments of the DAergic system, the hypothalamic–pituitary–adrenal axis, and pathological interactions between these two systems originating from fetal programming in a dual-system model to explain insufficient behavioral inhibition in affected adolescents.

The range of exogenous agents, such as alcohol and cocaine, which are generally likely to detrimentally affect the development of the brain and CNS defies estimation, although the accumulated evidence is substantial.^{57–60} Pubertal age affects the fundamental property of nervous tissue excitability; excessive excitatory drive is seen in early puberty and a deficiency is seen in late puberty. It has been postulated that, with adequate fish oils and fatty acids, the risk of psychopathology can be minimized, whereas a deficiency could lead to subcortical dysfunction in early puberty, and a breakdown of cortical circuitry and cognitive dysfunctions in late puberty.⁶¹ Thus, postpubertal psychoses, schizophrenia, and manic–depressive psychosis during the pubertal age, along with excitability, may be the result of continuous dietary deficiency, which may inhibit the expression of the oligodendrocyte-related genes responsible for myelinogenesis. The beneficial effect of fish oils and fatty acids in schizophrenia, fetal alcohol syndrome, developmental dyslexia, attention deficit hyperactivity disorder, and in other CNS disorders supports the hypothesis that the typical diet might be persistently deficient in the affected individuals, as illustrated in [Figure 6](#). However, the amount of fish oils and fatty acids needed to secure normal brain development and function is not known. It seems conjectural to postulate that a dietary deficiency in fish oils and fatty acids is causing brain dysfunction and death; however, all of these observations tend to suggest that a diet focusing on mainly protein is deficient, and the deficiency is most pronounced in maternal nutrition and in infancy, which might have a deleterious impact on the maturation of the adolescent brain.

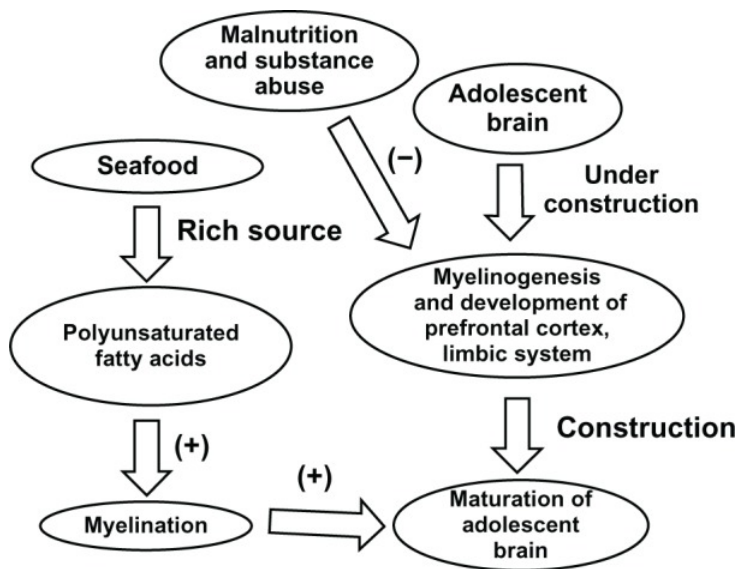


Figure 6

Effect of seafood on the maturation of the adolescent brain.

Notes: MRI studies have provided evidence that in addition to the prefrontal cortex and limbic system, myelinogenesis and neurocircuitry remains under construction during adolescence.^{1,7,19,21} Myelinogenesis requires precursors such as polyunsaturated fatty acids, of which many seafoods are a rich source. Hence, consuming seafood may accelerate brain maturation in adolescents. However, malnutrition and substance abuse may inhibit maturation of the adolescent brain. (+) induction; (-) inhibition.

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Conclusion

Neuromorphological, neurochemical, neurophysiological, neurobehavioral, and neuropharmacological evidence suggests that the brain remains in its active state of maturation during adolescence.^{1,7,19,21} Such evidence supports the hypothesis that the adolescent brain is structurally and functionally vulnerable to environmental stress, risky behavior, drug addiction, impaired driving, and unprotected sex. Computed tomography and MRI studies also provide evidence in support of this hypothesis.¹⁹

Brain maturation occurs during adolescence due to a surge in the synthesis of sex hormones implicated in puberty including estrogen, progesterone, and testosterone. These sex hormones augment myelinogenesis and the development of the neurocircuitry involved in efficient neurocybernetics. Although tubulinogenesis, axonogenesis, and synaptogenesis can occur during the prenatal and early postnatal periods, myelinogenesis involved in the insulation of axons remains under construction in adolescence. Sex hormones also significantly influence food intake and sleep requirements during puberty. In addition to dramatic changes in secondary sex characteristics, sex hormones may also influence the learning, intelligence, memory, and behavior of adolescents.

Furthermore, it can be observed that the development of excitatory glutamatergic neurotransmission occurs earlier in the developing brain as compared to GABAergic neurotransmission, which makes the pediatric population susceptible to seizures.

The development and maturation of the prefrontal cortex occurs primarily during adolescence and is fully accomplished at the age of 25 years. The development of the prefrontal cortex is very important for complex behavioral performance, as this region of the brain helps accomplish executive brain functions.

A detailed study is required in order to determine the exact biomarkers involved, as well as the intricate influence of diet, drugs, sex, and sleep on the maturation of the adolescent brain as discussed briefly in this report.

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1.6: Addiction and the Family

In a 2017 Pew Research survey, 46% of American adults said they have a family member or close friend who is addicted to drugs. Furthermore, data collected on household drug use from 2009-2014 indicated that 1 in 8 children age 17 and younger were growing up with at least one parent who had a substance use disorder (Lipari & Van Horn, 2017).

As much as the person suffering from a substance use disorder struggles, their friends, family, and loved ones also face tremendous challenges. Family members are impacted directly by the addiction. Their physical health, mental well-being, social lives, and family roles are all upended. In this chapter, we examine some of these impacts and look at ways for family members to find balance as they navigate a path toward their own recovery.

Below, you will hear one story of the impact of growing up in an addicted family:



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The following article is from the Substance Abuse and Mental Health Service Administration’s *Treatment Improvement Protocol* series (TIP 39: Substance Abuse Treatment and Family Therapy).

Impact of Substance Abuse on Families

Family structures in America have become more complex—growing from the traditional nuclear family to single-parent families, stepfamilies, foster families, and multigenerational families. Therefore, when a family member abuses substances, the effect on the family may differ according to family structure. This chapter discusses treatment issues likely to arise in different family structures that include a person abusing substances. For example, the non-substance-abusing parent may act as a “superhero” or may become very bonded with the children and too focused on ensuring their comfort. Treatment issues such as the economic consequences of substance abuse will be examined as will distinct psychological consequences that spouses, parents, and children experience. This chapter concludes with a description of social issues that coexist with substance abuse in families and recommends ways to address these issues in therapy.

Introduction

A growing body of literature suggests that substance abuse has distinct effects on different family structures. For example, the parent of small children may attempt to compensate for deficiencies that his or her substance-abusing spouse has developed as a consequence of that substance abuse (Brown and Lewis 1999). Frequently, children may act as surrogate spouses for the parent who abuses substances. For example, children may develop elaborate systems of denial to protect themselves against the reality of the parent’s addiction. Because that option does not exist in a single-parent household with a parent who abuses substances, children are likely to behave in a manner that is not age-appropriate to compensate for the parental deficiency (for more information, see *Substance Abuse Treatment: Addressing the Specific Needs of Women* [Center for Substance Abuse Treatment (CSAT) in development *e*] and TIP 32, *Treatment of Adolescents With Substance Use Disorders* [CSAT 1999*e*]). Alternately, the aging parents of adults with substance use disorders may maintain inappropriately dependent relationships with their grown offspring, missing the necessary “launching phase” in their relationship, so vital to the maturational processes of all family members involved.

The effects of substance abuse frequently extend beyond the nuclear family. Extended family members may experience feelings of abandonment, anxiety, fear, anger, concern, embarrassment, or guilt; they may wish to ignore or cut ties with the person abusing substances. Some family members even may feel the need for legal protection from the person abusing substances. Moreover, the effects on families may continue for generations. Intergenerational effects of substance abuse can have a negative impact on role modeling, trust, and concepts of normative behavior, which can damage the relationships between generations. For example, a child with a parent who abuses substances may grow up to be an overprotective and controlling parent who does not allow his or her children sufficient autonomy.

Neighbors, friends, and coworkers also experience the effects of substance abuse because a person who abuses substances often is unreliable. Friends may be asked to help financially or in other ways. Coworkers may be forced to compensate for decreased productivity or carry a disproportionate share of the workload. As a consequence, they may resent the person abusing substances.

People who abuse substances are likely to find themselves increasingly isolated from their families. Often they prefer associating with others who abuse substances or participate in some other form of antisocial activity. These associates support and reinforce each other's behavior.

Different treatment issues emerge based on the age and role of the person who uses substances in the family and on whether small children or adolescents are present. In some cases, a family might present a healthy face to the community while substance abuse issues lie just below the surface.

Reilly (1992) describes several characteristic patterns of interaction, one or more of which are likely to be present in a family that includes parents or children abusing alcohol or illicit drugs:

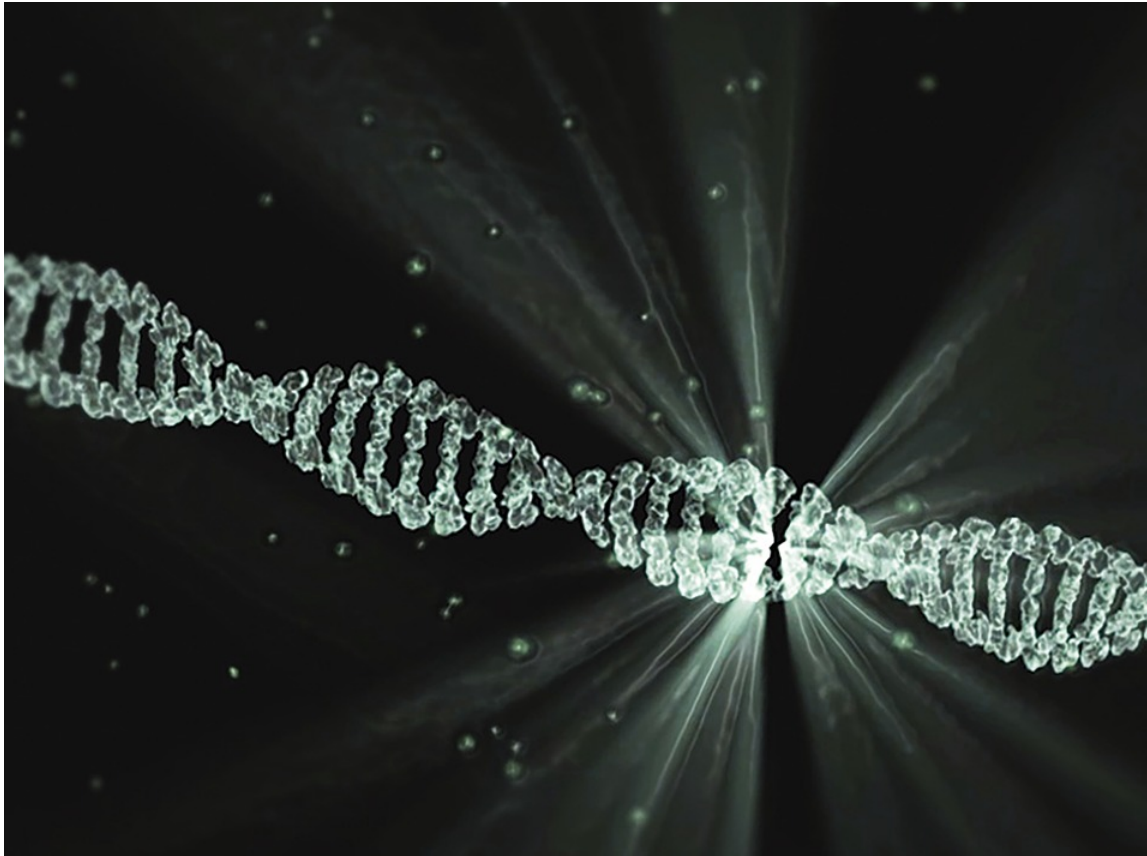
1. *Negativism*. Any communication that occurs among family members is negative, taking the form of complaints, criticism, and other expressions of displeasure. The overall mood of the household is decidedly downbeat, and positive behavior is ignored. In such families, the only way to get attention or enliven the situation is to create a crisis. This negativity may serve to reinforce the substance abuse.
- *Parental inconsistency*. Rule setting is erratic, enforcement is inconsistent, and family structure is inadequate. Children are confused because they cannot figure out the boundaries of right and wrong. As a result, they may behave badly in the hope of getting their parents to set clearly defined boundaries. Without known limits, children cannot predict parental responses and adjust their behavior accordingly. These inconsistencies tend to be present regardless of whether the person abusing substances is a parent or child and they create a sense of confusion—a key factor—in the children.

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1.7: Bio-Psycho-Social Issues

One of the most significant contributions to the assessment and treatment of addictions is the bio-psycho-social (BPS) model. This holistic concept allows us to consider a range of factors that influence the development and maintenance of addictive behavior.

Further, using a BPS approach to substance use disorders allows us to identify the context in which problematic drug use occurs (Buchmann, Skinner, & Illies, 2011). Although substance use disorder is a primary diagnosis, it does not occur in isolation. By recognizing individuals as whole people – with a rich history that involves friends, family, jobs, living environments, religious beliefs, personal values, and life experiences – we can better understand how harmful substance use emerged and what might help to change their unhealthy using patterns. A BPS model provides a foundation for understanding both the causes of addictive disorders and the best treatments for them.



The BPS model also fits well with the definition of addiction developed by the American Society of Addiction Medicine (ASAM), which incorporates physiology, psychology, and environment. ASAM utilizes an assessment format with six dimensions on which client concerns are evaluated prior to entering treatment. Those six ASAM dimensions include:

1. Risk of intoxication and withdrawal
2. Biomedical complications
3. Cognitive, emotional, and behavioral issues
4. Readiness to change
5. Relapse/continued use risk
6. Recovery environment

These dimensions can be broken down to match the three parts of the BPS framework. Dimensions one and two refer to biological concerns; dimensions three and four refer to psychological concerns; dimensions five and six refer to social concerns. The video below provides an overview of how the ASAM dimensions are applied by professional addictions counselors.



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Check your understanding of the ASAM assessment dimensions using the flashcards below:
A link to an interactive elements can be found at the bottom of this page.

Each of the six dimensions holds a key to the disease of addiction. The first two dimensions, the biological categories, uncover how physiology influences drug use. This might include pain management, physical disabilities, use of medications, or using to avoid withdrawal. Dimensions three and four describe individual characteristics such as emotional needs, behavioral concerns, and motivation. Earlier in the book, we discussed the role of trauma and co-occurring disorders in the development of substance use disorder. Unresolved trauma and mental health problems belong to this psychological aspect of the BPS assessment. Having a working knowledge of these concerns provides insight into how addiction emerges, as well as what needs to be included in a comprehensive plan of treatment. Importantly, it also points to addiction as a chronic illness, one which requires ongoing maintenance to manage successfully. The final two dimensions, five and six, incorporate social and environmental influences on the individual. Here we evaluate whether the people, places, and things in the person's life are supportive of sobriety or detrimental to the recovery process. One of the great struggles of the addictions field is that we are excellent at getting people sober, but we are poor at keeping them sober. The risk of relapse increases when "clients . . . do not live in environments that support recovery" (Polcin, Korcha, Bond, & Galloway, 2010). Thus, beyond managing withdrawal and promoting abstinence, treatment programs must emphasize the need for sober housing, stable employment, and a network of supportive contacts that nurture the recovering person's long-term sobriety.

Key Takeaways

- Addiction is a multi-dimensional problem.
- Recovery requires long-term solutions that address medical, psychological, and social concerns.

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Biology of Addiction

(Excerpted from the National Institutes of Health)

People with addiction lose control over their actions. They crave and seek out drugs, alcohol, or other substances no matter what the cost—even at the risk of damaging friendships, hurting family, or losing jobs. What is it about addiction that makes people behave in such destructive ways? And why is it so hard to quit?

NIH-funded scientists are working to learn more about the biology of addiction. They've shown that addiction is a long-lasting and complex brain disease, and that current treatments can help people control their addictions. But even for those who've successfully quit, there's always a risk of the addiction returning, which is called relapse.

The biological basis of addiction helps to explain why people need much more than good intentions or willpower to break their addictions.

“A common misperception is that addiction is a choice or moral problem, and all you have to do is stop. But nothing could be further from the truth,” says Dr. George Koob, director of NIH's National Institute on Alcohol Abuse and Alcoholism. “The brain actually changes with addiction, and it takes a good deal of work to get it back to its normal state. The more drugs or alcohol you've taken, the more disruptive it is to the brain.”

Researchers have found that much of addiction's power lies in its ability to hijack and even destroy key brain regions that are meant to help us survive.

A healthy brain rewards healthy behaviors—like exercising, eating, or bonding with loved ones. It does this by switching on brain circuits that make you feel wonderful, which then motivates you to repeat those behaviors. In contrast, when you're in danger, a healthy brain pushes your body to react quickly with fear or alarm, so you'll get out of harm's way. If you're tempted by something questionable—like eating ice cream before dinner or buying things you can't afford—the front regions of your brain can help you decide if the consequences are worth the actions.

But when you're becoming addicted to a substance, that normal hardwiring of helpful brain processes can begin to work against you. Drugs or alcohol can hijack the pleasure/reward circuits in your brain and hook you into wanting more and more. Addiction can also send your emotional danger-sensing circuits into overdrive, making you feel anxious and stressed when you're not using drugs or alcohol. At this stage, people often use drugs or alcohol to keep from feeling bad rather than for their pleasurable effects.

To add to that, repeated use of drugs can damage the essential decision-making center at the front of the brain. This area, known as the prefrontal cortex, is the very region that should help you recognize the harms of using addictive substances.

“Brain imaging studies of people addicted to drugs or alcohol show decreased activity in this frontal cortex,” says Dr. Nora Volkow, director of NIH's National Institute on Drug Abuse. “When the frontal cortex isn't working properly, people can't make the decision to stop taking the drug—even if they realize the price of taking that drug may be extremely high, and they might lose custody of their children or end up in jail. Nonetheless, they take it.”

Scientists don't yet understand why some people become addicted while others don't. Addiction tends to run in families, and certain types of genes have been linked to different forms of addiction. But not all members of an affected family are necessarily prone to addiction. “As with heart disease or diabetes, there's no one gene that makes you vulnerable,” Koob says.

Other factors can also raise your chances of addiction. “Growing up with an alcoholic; being abused as a child; being exposed to extraordinary stress—all of these social factors can contribute to the risk for alcohol addiction or drug abuse,” Koob says. “And with drugs or underage drinking, the earlier you start, the greater the likelihood of having alcohol use disorder or addiction later in life.”

Teens are especially vulnerable to possible addiction because their brains are not yet fully developed—particularly the frontal regions that help with impulse control and assessing risk. Pleasure circuits in adolescent brains also operate in overdrive, making drug and alcohol use even more rewarding and enticing.

Although there's much still to learn, we do know that prevention is critical to reducing the harms of addiction. “Childhood and adolescence are times when parents can get involved and teach their kids about a healthy lifestyle and activities that can protect against the use of drugs,” Volkow says. “Physical activity is important, as well as getting engaged in work, science projects, art, or social networks that do not promote use of drugs.”

Source: National Institutes of Health. 2015. *Biology of addiction: Drugs and alcohol can hijack your brain*. News in Health Newsletter (October 2015). <https://newsinhealth.nih.gov/2015/10...logy-addiction>

Drug Cultures, Recovery Cultures

A significant factor in the development and maintenance of addictive behavior is the context in which the behavior occurs. Drug-using rituals are often an ingrained part of life for people with substance use disorders. These deep-seated habits support ongoing use of the mind-altering substance.

Substance users, loved ones, and treatment providers need to realize that significant lifestyle changes are frequently required to replace the culture of addiction with a culture of recovery. In the following passage, the Substance Abuse and Mental Health Services Administration (SAMHSA) shares its insights into the role of drug cultures.

From SAMHSA Treatment Improvement Protocol (TIP) 59: Improving Cultural Competence

This chapter aims to explain that people who use drugs participate in a drug culture, and further, that they value this participation. However, not all people who abuse substances are part of a drug culture. White (1996) draws attention to a set of individuals whom he calls “acultural addicts.” These people initiate and sustain their substance use in relative isolation from other people who use drugs. Examples of acultural addicts include the medical professional who does not have to use illegal drug networks to abuse prescription medication, or the older, middle-class individual who “pill shops” from multiple doctors and procures drugs for misuse from pharmacies. Although drug cultures typically play a greater role in the lives of people who use illicit drugs, people who use legal substances—such as alcohol—are also likely to participate in such a culture (Gordon et al. 2012). Drinking cultures can develop among heavy drinkers at a bar or a college fraternity or sorority house that works to encourage new people to use, supports high levels of continued or binge use, reinforces denial, and develops rituals and customary behaviors surrounding drinking. In this chapter, drug culture refers to cultures that evolve from drug and alcohol use.

The Relationship Between Drug Cultures and Mainstream Culture

To some extent, subcultures define themselves in opposition to the mainstream culture. Subcultures may reject some, if not all, of the values and beliefs of the mainstream culture in favor of their own, and they will often adapt some elements of that culture in ways quite different from those originally intended (Hebdige 1991; Issitt 2009;). Individuals often identify with subcultures—such as drug cultures—because they feel excluded from or unable to participate in mainstream society. The subculture provides an alternative source of social support and cultural activities, but those activities can run counter to the best interests of the individual. Many subcultures are neither harmful nor antisocial, but their focus is on the substance(s) of abuse, not on the people who participate in the culture or their well-being.

Mainstream culture in the United States has historically frowned on most substance use and certainly substance abuse (Corrigan et al. 2009; White 1979, 1998). This can extend to legal substances such as alcohol or tobacco (including, in recent years, the increased prohibition against cigarette smoking in public spaces and its growing social unacceptability in private spaces). As a result, mainstream culture does not—for the most part—have an accepted role for most types of substance use, unlike many older cultures, which may accept use, for example, as part of specific religious rituals. Thus, people who experiment with drugs in the United States usually do so in highly marginalized social settings, which can contribute to the development of substance use disorders (Wilcox 1998). Individuals who are curious about substance use, particularly young people, are therefore more likely to become involved in a drug culture that encourages excessive use and experimentation with other, often stronger, substances (for a review of intervention strategies to reduce discrimination related to substance use disorders, see Livingston et al. 2012).

When people who abuse substances are marginalized, they tend not to seek access to mainstream institutions that typically provide sociocultural support (Myers et al. 2009). This can result in even stronger bonding with the drug culture. A marginalized person’s behavior is seen as abnormal even if he or she attempts to act differently, thus further reducing the chances of any attempt to change behavior (Cohen 1992). The drug culture enables its members to view substance use disorders as normal or even as status symbols. The disorder becomes a source of pride, and people may celebrate their drug-related identity with other members of the culture (Pearson and Bourgois 1995; White 1996). Social stigma also aids in the formation of oppositional values and beliefs that can promote unity among members of the drug culture.

When people with substance use disorders experience discrimination, they are likely to delay entering treatment and can have less positive treatment outcomes (Fortney et al. 2004; Link et al. 1997; Semple et al. 2005). Discrimination can also increase denial and step up the individual’s attempts to hide substance use (Mateu-Gelabert et al. 2005). The immorality that mainstream society attaches to substance use and abuse can unintentionally serve to strengthen individuals’ ties with the drug culture and decrease the likelihood that they will seek treatment.

The relationship between the drug and mainstream cultures is not unidirectional. Since the beginning of a definable drug culture, that culture has had an effect on mainstream cultural institutions, particularly through music, art, and literature. These connections

can add significantly to the attraction a drug culture holds for some individuals (especially the young and those who pride themselves on being nonconformists) and create a greater risk for substance use escalating to abuse and relapse.

Understanding Why People Are Attracted to Drug Cultures

To understand what an individual gains from participating in a drug culture, it is important first to examine some of the factors involved in substance use and the development of substance use disorders. Despite having differing theories about the root causes of substance use disorders, most researchers would agree that substance abuse is, to some extent, a learned behavior. Beginning with Becker's (1953) seminal work, research has shown that many commonly abused substances are not automatically experienced as pleasurable by people who use them for the first time (Fekjaer 1994). For instance, many people find the taste of alcoholic beverages disagreeable during their first experience with them, and they only learn to experience these effects as pleasurable over time. Expectations can also be important among people who use drugs; those who have greater expectancies of pleasure typically have a more intense and pleasurable experience. These expectancies may play a part in the development of substance use disorders (Fekjaer 1994; Leventhal and Schmitz 2006).

Key Takeaways

- Expectancies, or anticipated effects, develop based on the information we gather from parents, peers, and media.
- These anticipated effects then play in part in how we experience drug use.
- When we anticipate a drug to have a certain effect, it tends to influence how we feel when we use the drug (similar to a placebo effect).
- Studies have even shown that people drinking a non-alcoholic placebo acted similarly to people who were consuming alcohol. (Bodnár, V., Nagy, K., Ciboly, Á. C., & Bárdos, G. (2018). The placebo effect and the alcohol. *Journal of Mental Health and Psychosomatics*, 19(1), 1–12.)

Additionally, drug-seeking and other behaviors associated with substance use have a reinforcing effect beyond that of the actual drugs. Activities such as rituals of use, which make up part of the drug culture, provide a focus for those who use drugs when the drugs themselves are unavailable and help them shift attention away from problems they might otherwise need to face (Lende 2005).

Drug cultures serve as an initiating force as well as a sustaining force for substance use and abuse (White 1996). As an initiating force, the culture provides a way for people new to drug use to learn what to expect and how to appreciate the experience of getting high. As White (1996) notes, the drug culture teaches the new user “how to recognize and enjoy drug effects” (p. 46). There are also practical matters involved in using substances (e.g., how much to take, how to ingest the substance for strongest effect) that people new to drug use may not know when they first begin to experiment with drugs. The skills needed to use some drugs can be quite complicated.

The drug culture has an appeal all its own that promotes initiation into drug use. Stephens (1991) uses examples from a number of ethnographic studies to show how people can be as taken by the excitement of the drug culture as they are by the drug itself. Media portrayals, along with singer or music group autobiographies, that glamorize the drug lifestyle may increase its lure (Manning 2007; Oksanen 2012). In buying (and perhaps selling) drugs, individuals can find excitement that is missing in their lives. They can likewise find a sense of purpose they otherwise lack in the daily need to seek out and acquire drugs. In successfully navigating the difficulties of living as a person who uses drugs, they can gain approval from peers who use drugs and a feeling that they are successful at something.

Marginalized adolescents and young adults find drug cultures particularly appealing. Many individual, family, and social risk factors associated with adolescent substance abuse are also risk factors for youth involvement with a drug culture. Individual factors—such as feelings of alienation from society and a strong rejection of authority—can cause youth to look outside the traditional cultural institutions available to them (family, church, school, etc.) and instead seek acceptance in a subculture, such as a drug culture (Hebdige 1991; Moshier et al. 2012). Individual traits like sensation-seeking and poor impulse control, which can interfere with functioning in mainstream society, are often tolerated or can be freely expressed in a drug culture. Family involvement with drugs is a significant risk factor due to additional exposure to the drug lifestyle, as well as early learning of the values and behaviors (e.g., lying to cover for parents' illicit activities) associated with it (Haight et al. 2005). Social risk factors (e.g., rejection by peers, poverty, failure in school) can also increase young people's alienation from traditional cultural institutions. The need for social acceptance is a major reason many young people begin to use drugs, as social acceptance can be found with less effort within the drug culture.

In addition to helping initiate drug use, drug cultures serve as sustaining forces. They support continued use and reinforce denial that a problem with alcohol or drugs exists. The importance of the drug culture to the person using drugs often increases with time as the person's association with it deepens (Moshier et al. 2012). White (1996) notes that as a person progresses from experimentation to abuse and/or dependence, he or she develops a more intense need to “seek for supports to sustain the drug relationship” (p. 9). In addition to gaining social sanction for their substance use, participants in the drug culture learn many skills that can help them avoid the pitfalls of the substance-abusing lifestyle and thus continue their use. They learn how to avoid arrest, how to get money to support their habit, and how to find a new supplier when necessary.

The more an individual's needs are met within a drug culture, the harder it will be to leave that culture behind. White (1996) gives an example of a person who was initially attracted in youth to a drug culture because of a desire for social acceptance and then grew up within that culture. Through involvement in the drug culture, he was able to gain a measure of self-esteem, change his family dynamic, explore his sexuality, develop lasting friendships, and find a career path (albeit a criminal one). For this individual, who had so much of his life invested in the drug culture, it was as difficult to conceive of leaving that culture as it was to conceive of stopping his substance use.

Finding Alternatives to Drug Cultures

A client can meet the psychosocial needs previously satisfied by the drug culture in a number of ways. Strengthening cultural identity can be a positive action for the client; in some cases, the client's family or cultural peers can serve as a replacement for involvement in the drug culture. This option is particularly helpful when the client's connection to a drug culture is relatively weak and his or her traditional culture is relatively strong. However, when this option is unavailable or insufficient, clinicians must focus on replacing the client's ties with the drug culture (or the culture of addiction) with new ties to a culture of recovery.

To help clients break ties with drug cultures, programs need to challenge clients' continued involvement with elements of those cultures (e.g., style of dress, music, language, or communication patterns). This can occur through two basic processes: replacing the element with something new that is positively associated with a culture of recovery (e.g., replacing a marijuana leaf keychain with an NA keychain), and reframing something so that it is no longer associated with drug use or the drug culture (e.g., listening to music that was associated with the drug culture at a sober dance with others in recovery; White 1996). The process will depend on the nature of the cultural element.

Developing a Culture of Recovery

Just as people who are actively using or abusing substances bond over that common experience to create a drug culture that supports their continued substance use, people in recovery can participate in activities with others who are having similar experiences to build a culture of recovery. There is no single drug culture; likewise, there is no single culture of recovery. However, large international mutual-help organizations like Alcoholics Anonymous (AA) do represent the culture of recovery for many individuals. Even within such organizations, though, there is some cultural diversity; regional differences exist, for example, in meeting-related rituals or attitudes toward certain issues (e.g., use of prescribed psychotropic medication, approaches to spirituality).

Treatment programs need to have a plan for creating a culture of recovery.

Programs that do not have a plan for creating a culture of recovery among clients risk their clients returning to the drug culture or holding on to elements of that culture because it meets their basic and social needs. In the worst case scenario, clients will recreate a drug culture among themselves within the program. In the best case, staff members will have a plan for creating a culture of recovery within their treatment population.

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1.8: Assessment and Treatment of Substance Use Disorders

Before someone receives substance use disorder treatment, he or she must be both screened and assessed to determine whether services are needed and what type of treatment best matches the situation. The screening process is generally brief and provides feedback suggesting that someone does or does not have a problem requiring treatment. Some screening tools can even be self-administered. Among the most-used screening instruments are the short four-question [CAGE survey](#) and the [Alcohol Use Disorder Identification Test](#), or AUDIT. These tools provide insight into the presence of a problem and set up the next step of looking for helpful programs or interventions to address the problem.



In contrast to the screening process, assessment is a longer and more formal process conducted by a trained professional. The assessment helps to clarify the specific problem areas to address in treatment and at what level of intensity the person should be treated. At the end of this chapter is a chart created by the National Institute on Drug Abuse that highlights several available screening and assessment tools.

Once a substance use problem has been identified and a recommendation for treatment has been made, a person can begin receiving services. There are numerous options when it comes to treating substance use disorder. In the next chapter, we discuss the importance of having several options available and utilizing multiple pathways to recovery. Here we look at the tools of the treatment provider and what a course of treatment might look like.

To start, let's look at the story of someone who may need treatment services:

Sample Client

Jessica is a 26-year-old woman who recently received her second driving-under-the-influence (DUI) ticket and has been charged with a misdemeanor crime. She got her first DUI at age 21 and lost her license for one year. During that time, she completed a basic risk education DUI course and paid several thousand dollars in fines and attorney's fees.

Jessica drinks with her friends on weekends, usually having five or six drinks per night. One of Jessica's best friends growing up (Kaitlin) has started distancing herself from Jessica because she does not like how much their other friends are drinking. Kaitlin still occasionally invites Jessica to hang out, but Jessica refuses because there is no drinking involved.

In addition to alcohol, Jessica has started taking Xanax, a benzodiazepine. Although she has a prescription from her doctor to take Xanax to help treat her anxiety disorder, Jessica often takes more than prescribed, sometimes even mixing the pills with her alcohol consumption.

Jessica works a full-time job as a graphic designer and does most of her work from home. She says that she has little time to socialize during the week, so she looks forward to the weekend when she can see her friends and relax.

Now that she has a second DUI, Jessica has lost her license again, although she is not overly concerned because she can continue working from home and can walk or order a ride wherever she needs to go.

The court has ordered Jessica to have an evaluation done and to complete any treatment recommendations.

Although this is an imaginary client, the story probably applies to many of the clients who seek treatment. A screening of Jessica would reveal that she likely meets the criteria for a substance use disorder and should receive a full assessment. (*Note that a screening tool alone never diagnoses a substance use disorder.*)

The exercise below gives you the opportunity to apply the knowledge you have learned in this book to her case.

Exercise

Consider the story of Jessica in the example above:

- What stands out about her story?
- Identify the drug or drugs that might be a problem for Jessica.
- If you were evaluating Jessica, what are some of the questions you would ask her?
- List at least three issues that might be addressed in a treatment plan for Jessica.
- How many of the DSM-5 criteria for Substance Use Disorder can you identify from the brief description above?
- How do her legal issues impact treatment?

Treatment services can be performed at several levels of care. These levels are defined by the American Society of Addiction Medicine (ASAM).

ASAM Levels of Care

Level 0.5: Risk Education

Level I: Outpatient

Level II.1: Intensive Outpatient

Level II.5: Partial Hospitalization

Level III.1: Residential Recovery Homes

Level III.5: High-Intensity Residential

Level IV: Medically Managed Inpatient (Hospitalization)

A critical part of the assessment is recommending the appropriate level of care based on the client's bio-psycho-social needs. The higher the level, the more intense the treatment. Other issues to consider are the client's level of motivation, payment source, transportation, and child care. If a client requires medical detoxification, that should be completed prior to beginning treatment.

It is also a good idea to involve a client's physician when possible. With the case of Jessica, she would benefit from an evaluation to determine if she can safely withdraw from two potentially life-threatening drugs, alcohol and Xanax.

Flip through the cards below to review the levels of treatment care.

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

<https://cod.pressbooks.pub/addiction/?p=50>

Principles of Drug Addiction Treatment: A Research-Based Guide (NIDA, 2018)

Preface

Drug addiction is a complex illness.

It is characterized by intense and, at times, uncontrollable drug craving, along with compulsive drug seeking and use that persist even in the face of devastating consequences. This update of the National Institute on Drug Abuse's *Principles of Drug Addiction Treatment* is intended to address addiction to a wide variety of drugs, including nicotine, alcohol, and illicit and prescription drugs. It is designed to serve as a resource for healthcare providers, family members, and other stakeholders trying to address the myriad problems faced by patients in need of treatment for drug abuse or addiction.

Addiction affects multiple brain circuits, including those involved in reward and motivation, learning and memory, and inhibitory control over behavior. That is why addiction is a brain disease. Some individuals are more vulnerable than others to becoming addicted, depending on the interplay between genetic makeup, age of exposure to drugs, and other environmental influences. While a person initially chooses to take drugs, over time the effects of prolonged exposure on brain functioning compromise that ability to choose, and seeking and consuming the drug become compulsive, often eluding a person's self-control or willpower.

But addiction is more than just compulsive drug taking—it can also produce far-reaching health and social consequences. For example, drug abuse and addiction increase a person's risk for a variety of other mental and physical illnesses related to a drug-abusing lifestyle or the toxic effects of the drugs themselves. Additionally, the dysfunctional behaviors that result from drug abuse can interfere with a person's normal functioning in the family, the workplace, and the broader community.

Because drug abuse and addiction have so many dimensions and disrupt so many aspects of an individual's life, treatment is not simple. Effective treatment programs typically incorporate many components, each directed to a particular aspect of the illness and its consequences. Addiction treatment must help the individual stop using drugs, maintain a drug-free lifestyle, and achieve productive functioning in the family, at work, and in society. Because addiction is a disease, most people cannot simply stop using drugs for a few days and be cured. Patients typically require long-term or repeated episodes of care to achieve the ultimate goal of sustained abstinence and recovery of their lives. Indeed, scientific research and clinical practice demonstrate the value of continuing care in treating addiction, with a variety of approaches having been tested and integrated in residential and community settings.

As we look toward the future, we will harness new research results on the influence of genetics and environment on gene function and expression (i.e., epigenetics), which are heralding the development of personalized treatment interventions. These findings will be integrated with current evidence supporting the most effective drug abuse and addiction treatments and their implementation, which are reflected in this guide.

Principles of Effective Treatment: Dr. Nora Volkow, Director of the National Institute on Drug Abuse

- Addiction is a complex but treatable disease that affects brain function and behavior.** Drugs of abuse alter the brain's structure and function, resulting in changes that persist long after drug use has ceased. This may explain why drug abusers are at risk for relapse even after long periods of abstinence and despite the potentially devastating consequences.
- No single treatment is appropriate for everyone.** Treatment varies depending on the type of drug and the characteristics of the patients. Matching treatment settings, interventions, and services to an individual's particular problems and needs is critical to his or her ultimate success in returning to productive functioning in the family, workplace, and society.
- Treatment needs to be readily available.** Because drug-addicted individuals may be uncertain about entering treatment, taking advantage of available services the moment people are ready for treatment is critical. Potential patients can be lost if treatment is not immediately available or readily accessible. As with other chronic diseases, the earlier treatment is offered in the disease process, the greater the likelihood of positive outcomes.
- Effective treatment attends to multiple needs of the individual, not just his or her drug abuse.** To be effective, treatment must address the individual's drug abuse and any associated medical, psychological, social, vocational, and legal problems. It is also important that treatment be appropriate to the individual's age, gender, ethnicity, and culture.
- Remaining in treatment for an adequate period of time is critical.** The appropriate duration for an individual depends on the type and degree of the patient's problems and needs. Research indicates that most addicted individuals need at least 3 months in treatment to significantly reduce or stop their drug use and that the best outcomes occur with longer durations of treatment. Recovery from drug addiction is a long-term process and frequently requires multiple episodes of treatment. As with other chronic illnesses, relapses to drug abuse can occur and should signal a need for treatment to be reinstated or adjusted. Because individuals often leave treatment prematurely, programs should include strategies to engage and keep patients in treatment.
- Behavioral therapies—including individual, family, or group counseling—are the most commonly used forms of drug abuse treatment.** Behavioral therapies vary in their focus and may involve addressing a patient's motivation to change, providing incentives for abstinence, building skills to resist drug use, replacing drug-using activities with constructive and rewarding activities, improving problem-solving skills, and facilitating better interpersonal relationships. Also, participation in group therapy and other peer support programs during and following treatment can help maintain abstinence.
- Medications are an important element of treatment for many patients, especially when combined with counseling and other behavioral therapies.** For example, methadone, buprenorphine, and naltrexone (including a new long-acting formulation) are effective in helping individuals addicted to heroin or other opioids stabilize their lives and reduce their illicit drug use. Acamprosate, disulfiram, and naltrexone are medications approved for treating alcohol dependence. For persons addicted to nicotine, a nicotine replacement product (available as patches, gum, lozenges, or nasal spray) or an oral medication (such as bupropion or varenicline) can be an effective component of treatment when part of a comprehensive behavioral treatment program.
- An individual's treatment and services plan must be assessed continually and modified as necessary to ensure that it meets his or her changing needs.** A patient may require varying combinations of services and treatment components during the course of treatment and recovery. In addition to counseling or psychotherapy, a patient may require medication, medical services, family therapy, parenting instruction, vocational rehabilitation, and/or social and legal services. For many patients, a continuing care approach provides the best results, with the treatment intensity varying according to a person's changing needs.
- Many drug-addicted individuals also have other mental disorders.** Because drug abuse and addiction—both of which are mental disorders—often co-occur with other mental illnesses, patients presenting with one condition should be assessed for the other(s). And when these problems co- occur, treatment should address both (or all), including the use of medications as appropriate.
- Medically assisted detoxification is only the first stage of addiction treatment and by itself does little to change long-term drug abuse.** Although medically assisted detoxification can safely manage the acute physical symptoms of withdrawal and can, for some, pave the way for effective long-term addiction treatment, detoxification alone is rarely sufficient to help addicted individuals achieve long-term abstinence. Thus, patients should be encouraged to continue drug treatment following detoxification. Motivational enhancement and incentive strategies, begun at initial patient intake, can improve treatment engagement.
- Treatment does not need to be voluntary to be effective.** Sanctions or enticements from family, employment settings, and/or the criminal justice system can significantly increase treatment entry, retention rates, and the ultimate success of drug treatment interventions.
- Drug use during treatment must be monitored continuously, as lapses during treatment do occur.** Knowing their drug use is being monitored can be a powerful incentive for patients and can help them withstand urges to use drugs. Monitoring also provides an early indication of a return to drug use, signaling a possible need to adjust an individual's treatment plan to better meet his or her needs.
- Treatment programs should test patients for the presence of HIV/AIDS, hepatitis B and C, tuberculosis, and other infectious diseases as well as provide targeted risk-reduction counseling, linking patients to treatment if necessary.** Typically, drug abuse treatment addresses some of the drug-related behaviors that put people at risk of infectious diseases. Targeted counseling focused on reducing infectious disease risk can help patients further reduce or avoid substance-related and other high-risk behaviors. Counseling can also help those who are already infected to

manage their illness. Moreover, engaging in substance abuse treatment can facilitate adherence to other medical treatments. Substance abuse treatment facilities should provide onsite, rapid HIV testing rather than referrals to offsite testing—research shows that doing so increases the likelihood that patients will be tested and receive their test results. Treatment providers should also inform patients that highly active antiretroviral therapy (HAART) has proven effective in combating HIV, including among drug-abusing populations, and help link them to HIV treatment if they test positive. **Frequently Asked Questions** *Why do drug-addicted persons keep using drugs?* Nearly all addicted individuals believe at the outset that they can stop using drugs on their own, and most try to stop without treatment. Although some people are successful, many attempts result in failure to achieve long-term abstinence. Research has shown that long-term drug abuse results in changes in the brain that persist long after a person stops using drugs. These drug-induced changes in brain function can have many behavioral consequences, including an inability to exert control over the impulse to use drugs despite adverse consequences—the defining characteristic of addiction. Understanding that addiction has such a fundamental biological component may help explain the difficulty of achieving and maintaining abstinence without treatment. Psychological stress from work, family problems, psychiatric illness, pain associated with medical problems, social cues (such as meeting individuals from one's drug-using past), or environmental cues (such as encountering streets, objects, or even smells associated with drug abuse) can trigger intense cravings without the individual even being consciously aware of the triggering event. Any one of these factors can hinder attainment of sustained abstinence and make relapse more likely. Nevertheless, research indicates that active participation in treatment is an essential component for good outcomes and can benefit even the most severely addicted individuals. *What is drug addiction treatment?*

Drug treatment is intended to help addicted individuals stop compulsive drug seeking and use. Treatment can occur in a variety of settings, take many different forms, and last for different lengths of time. Because drug addiction is typically a chronic disorder characterized by occasional relapses, a short-term, one-time treatment is usually not sufficient. For many, treatment is a long-term process that involves multiple interventions and regular monitoring. There are a variety of evidence-based approaches to treating addiction. Drug treatment can include behavioral therapy (such as cognitive-behavioral therapy or contingency management), medications, or their combination. The specific type of treatment or combination of treatments will vary depending on the patient's individual needs and, often, on the types of drugs they use.

Treatment medications, such as methadone, buprenorphine, and naltrexone (including a new long-acting formulation), are available for individuals addicted to opioids, while nicotine preparations (patches, gum, lozenges, and nasal spray) and the medications varenicline and bupropion are available for individuals addicted to tobacco. Disulfiram, acamprosate, and naltrexone are medications available for treating alcohol dependence, which commonly co-occurs with other drug addictions, including addiction to prescription medications.

Key Takeaways

Drug addiction treatment can include medications, behavioral therapies, or their combination.

Treatments for prescription drug abuse tend to be similar to those for illicit drugs that affect the same brain systems. For example, buprenorphine, used to treat heroin addiction, can also be used to treat addiction to opioid pain medications. Addiction to prescription stimulants, which affect the same brain systems as illicit stimulants like cocaine, can be treated with behavioral therapies, as there are not yet medications for treating addiction to these types of drugs.

Behavioral therapies can help motivate people to participate in drug treatment, offer strategies for coping with drug cravings, teach ways to avoid drugs and prevent relapse, and help individuals deal with relapse if it occurs. Behavioral therapies can also help people improve communication, relationship, and parenting skills, as well as family dynamics.

Many treatment programs employ both individual and group therapies. Group therapy can provide social reinforcement and help enforce behavioral contingencies that promote abstinence and a non-drug-using lifestyle. Some of the more established behavioral treatments, such as contingency management and cognitive-behavioral therapy, are also being adapted for group settings to improve efficiency and cost-effectiveness. However, particularly in adolescents, there can also be a danger of unintended harmful (or iatrogenic) effects of group treatment—sometimes group members (especially groups of highly delinquent youth) can reinforce drug use and thereby derail the purpose of the therapy. Thus, trained counselors should be aware of and monitor for such effects.

Because they work on different aspects of addiction, combinations of behavioral therapies and medications (when available) generally appear to be more effective than either approach used alone. Finally, people who are addicted to drugs often suffer from other health (e.g., depression, HIV), occupational, legal, familial, and social problems that should be addressed concurrently. The best programs provide a combination of therapies and other services to meet an individual patient's needs. Psychoactive medications, such as antidepressants, anti-anxiety agents, mood stabilizers, and antipsychotic medications, may be critical for treatment success when patients have co-occurring mental disorders such as depression, anxiety disorders (including post-traumatic

stress disorder), bipolar disorder, or schizophrenia. In addition, most people with severe addiction abuse multiple drugs and require treatment for all substances abused.

Treatment for drug abuse and addiction is delivered in many different settings, using a variety of behavioral and pharmacological approaches.

How effective is drug addiction treatment?

In addition to stopping drug abuse, the goal of treatment is to return people to productive functioning in the family, workplace, and community. According to research that tracks individuals in treatment over extended periods, most people who get into and remain in treatment stop using drugs, decrease their criminal activity, and improve their occupational, social, and psychological functioning. For example, methadone treatment has been shown to increase participation in behavioral therapy and decrease both drug use and criminal behavior. However, individual treatment outcomes depend on the extent and nature of the patient's problems, the appropriateness of treatment and related services used to address those problems, and the quality of interaction between the patient and his or her treatment providers.

Like other chronic diseases, addiction can be managed successfully. Treatment enables people to counteract addiction's powerful disruptive effects on the brain and behavior and to regain control of their lives. The chronic nature of the disease means that relapsing to drug abuse is not only possible but also likely, with symptom recurrence rates similar to those for other well-characterized chronic medical illnesses—such as diabetes, hypertension, and asthma (see figure, “Comparison of Relapse Rates Between Drug Addiction and Other Chronic Illnesses”)—that also have both physiological and behavioral components.

Unfortunately, when relapse occurs many deem treatment a failure. This is not the case: Successful treatment for addiction typically requires continual evaluation and modification as appropriate, similar to the approach taken for other chronic diseases. For example, when a patient is receiving active treatment for hypertension and symptoms decrease, treatment is deemed successful, even though symptoms may recur when treatment is discontinued. For the addicted individual, lapses to drug abuse do not indicate failure—rather, they signify that treatment needs to be reinstated or adjusted, or that alternate treatment is needed (see figure, “Why is Addiction Treatment Evaluated Differently?”).

Is drug addiction treatment worth its cost?

Substance abuse costs our nation over \$600 billion annually and treatment can help reduce these costs. Drug addiction treatment has been shown to reduce associated health and social costs by far more than the cost of the treatment itself. Treatment is also much less expensive than its alternatives, such as incarcerating addicted persons. For example, the average cost for 1 full year of methadone maintenance treatment is approximately \$4,700 per patient, whereas 1 full year of imprisonment costs approximately \$24,000 per person.

According to several conservative estimates, every dollar invested in addiction treatment programs yields a return of between \$4 and \$7 in reduced drug-related crime, criminal justice costs, and theft. When savings related to healthcare are included, total savings can exceed costs by a ratio of 12 to 1. Major savings to the individual and to society also stem from fewer interpersonal conflicts; greater workplace productivity; and fewer drug-related accidents, including overdoses and deaths.

How long does drug addiction treatment usually last?

Individuals progress through drug addiction treatment at various rates, so there is no predetermined length of treatment. However, research has shown unequivocally that good outcomes are contingent on adequate treatment length. Generally, for residential or outpatient treatment, participation for less than 90 days is of limited effectiveness, and treatment lasting significantly longer is recommended for maintaining positive outcomes. For methadone maintenance, 12 months is considered the minimum, and some opioid-addicted individuals continue to benefit from methadone maintenance for many years.

Treatment dropout is one of the major problems encountered by treatment programs; therefore, motivational techniques that can keep patients engaged will also improve outcomes. By viewing addiction as a chronic disease and offering continuing care and monitoring, programs can succeed, but this will often require multiple episodes of treatment and readily readmitting patients that have relapsed.

What helps people stay in treatment?

Because successful outcomes often depend on a person's staying in treatment long enough to reap its full benefits, strategies for keeping people in treatment are critical. Whether a patient stays in treatment depends on factors associated with both the individual and the program. Individual factors related to engagement and retention typically include motivation to change drug-using behavior; degree of support from family and friends; and, frequently, pressure from the criminal justice system, child protection services, employers, or family. Within a treatment program, successful clinicians can establish a positive, therapeutic relationship with their patients. The clinician should ensure that a treatment plan is developed cooperatively with the person seeking treatment, that the plan is followed, and that treatment expectations are clearly understood. Medical, psychiatric, and social services should also be available.

Key Takeaways

Whether a patient stays in treatment depends on factors associated with both the individual and the program.

Because some problems (such as serious medical or mental illness or criminal involvement) increase the likelihood of patients dropping out of treatment, intensive interventions may be required to retain them. After a course of intensive treatment, the provider should ensure a transition to less intensive continuing care to support and monitor individuals in their ongoing recovery.

How do we get more substance-abusing people into treatment?

It has been known for many years that the “treatment gap” is massive—that is, among those who need treatment for a substance use disorder, few receive it. In 2011, 21.6 million persons aged 12 or older needed treatment for an illicit drug or alcohol use problem, but only 2.3 million received treatment at a specialty substance abuse facility.

Reducing this gap requires a multipronged approach. Strategies include increasing access to effective treatment, achieving insurance parity (now in its earliest phase of implementation), reducing stigma, and raising awareness among both patients and healthcare professionals of the value of addiction treatment. To assist physicians in identifying treatment need in their patients and making appropriate referrals, NIDA is encouraging widespread use of screening, brief intervention, and referral to treatment (SBIRT) tools for use in primary care settings through its NIDAMED initiative. SBIRT, which evidence shows to be effective against tobacco and alcohol use—and, increasingly, against abuse of illicit and prescription drugs—has the potential not only to catch people before serious drug problems develop, but also to identify people in need of treatment and connect them with appropriate treatment providers.

How can family and friends make a difference in the life of someone needing treatment?

Family and friends can play critical roles in motivating individuals with drug problems to enter and stay in treatment. Family therapy can also be important, especially for adolescents. Involvement of a family member or significant other in an individual's treatment program can strengthen and extend treatment benefits.

How can the workplace play a role in substance abuse treatment?

Many workplaces sponsor Employee Assistance Programs (EAPs) that offer short-term counseling and/or assistance in linking employees with drug or alcohol problems to local treatment resources, including peer support/recovery groups. In addition, therapeutic work environments that provide employment for drug-abusing individuals who can demonstrate abstinence have been shown not only to promote a continued drug-free lifestyle but also to improve job skills, punctuality, and other behaviors necessary for active employment throughout life. Urine testing facilities, trained personnel, and workplace monitors are needed to implement this type of treatment.

What role can the criminal justice system play in addressing drug addiction?

It is estimated that about one-half of State and Federal prisoners abuse or are addicted to drugs, but relatively few receive treatment while incarcerated. Initiating drug abuse treatment in prison and continuing it upon release is vital to both individual recovery and to public health and safety. Various studies have shown that combining prison- and community-based treatment for addicted offenders reduces the risk of both recidivism to drug-related criminal behavior and relapse to drug use—which, in turn, nets huge savings in societal costs. A 2009 study in Baltimore, Maryland, for example, found that opioid-addicted prisoners who started methadone treatment (along with counseling) in prison and then continued it after release had better outcomes (reduced drug use and criminal activity) than those who only received counseling while in prison or those who only started methadone treatment after their release.

Key Takeaways

Individuals who enter treatment under legal pressure have outcomes as favorable as those who enter treatment voluntarily.

The majority of offenders involved with the criminal justice system are not in prison but are under community supervision. For those with known drug problems, drug addiction treatment may be recommended or mandated as a condition of probation. Research has demonstrated that individuals who enter treatment under legal pressure have outcomes as favorable as those who enter treatment voluntarily.

The criminal justice system refers drug offenders into treatment through a variety of mechanisms, such as diverting nonviolent offenders to treatment; stipulating treatment as a condition of incarceration, probation, or pretrial release; and convening specialized courts, or drug courts, that handle drug offense cases. These courts mandate and arrange for treatment as an alternative to incarceration, actively monitor progress in treatment, and arrange for other services for drug-involved offenders.

The most effective models integrate criminal justice and drug treatment systems and services. Treatment and criminal justice personnel work together on treatment planning—including implementation of screening, placement, testing, monitoring, and supervision—as well as on the systematic use of sanctions and rewards. Treatment for incarcerated drug abusers should include continuing care, monitoring, and supervision after incarceration and during parole. Methods to achieve better coordination between parole/probation officers and health providers are being studied to improve offender outcomes.

What are the unique needs of women with substance use disorders?

Gender-related drug abuse treatment should attend not only to biological differences but also to social and environmental factors, all of which can influence the motivations for drug use, the reasons for seeking treatment, the types of environments where treatment is obtained, the treatments that are most effective, and the consequences of not receiving treatment. Many life circumstances predominate in women as a group, which may require a specialized treatment approach. For example, research has shown that physical and sexual trauma followed by post-traumatic stress disorder (PTSD) is more common in drug-abusing women than in men seeking treatment. Other factors unique to women that can influence the treatment process include issues around how they come into treatment (as women are more likely than men to seek the assistance of a general or mental health practitioner), financial independence, and pregnancy and child care.

What are the unique needs of pregnant women with substance use disorders?

Using drugs, alcohol, or tobacco during pregnancy exposes not just the woman but also her developing fetus to the substance and can have potentially deleterious and even long-term effects on exposed children. Smoking during pregnancy can increase risk of stillbirth, infant mortality, sudden infant death syndrome, preterm birth, respiratory problems, slowed fetal growth, and low birth weight. Drinking during pregnancy can lead to the child developing fetal alcohol spectrum disorders, characterized by low birth weight and enduring cognitive and behavioral problems.

Prenatal use of some drugs, including opioids, may cause a withdrawal syndrome in newborns called neonatal abstinence syndrome (NAS). Babies with NAS are at greater risk of seizures, respiratory problems, feeding difficulties, low birth weight, and even death.

Research has established the value of evidence-based treatments for pregnant women (and their babies), including medications. For example, although no medications have been FDA-approved to treat opioid dependence in pregnant women, methadone maintenance combined with prenatal care and a comprehensive drug treatment program can improve many of the detrimental outcomes associated with untreated heroin abuse. However, newborns exposed to methadone during pregnancy still require treatment for withdrawal symptoms. Recently, another medication option for opioid dependence, buprenorphine, has been shown to produce fewer NAS symptoms in babies than methadone, resulting in shorter infant hospital stays. In general, it is important to closely monitor women who are trying to quit drug use during pregnancy and to provide treatment as needed.

What are the unique needs of adolescents with substance use disorders?

Adolescent drug abusers have unique needs stemming from their immature neurocognitive and psychosocial stage of development. Research has demonstrated that the brain undergoes a prolonged process of development and refinement from birth through early adulthood. Over the course of this developmental period, a young person's actions go from being more impulsive to being more reasoned and reflective. In fact, the brain areas most closely associated with aspects of behavior such as decision-making, judgment, planning, and self-control undergo a period of rapid development during adolescence and young adulthood.

Adolescent drug abuse is also often associated with other co-occurring mental health problems. These include attention-deficit hyperactivity disorder (ADHD), oppositional defiant disorder, and conduct problems, as well as depressive and anxiety disorders.

Adolescents are also especially sensitive to social cues, with peer groups and families being highly influential during this time. Therefore, treatments that facilitate positive parental involvement, integrate other systems in which the adolescent participates (such as school and athletics), and recognize the importance of prosocial peer relationships are among the most effective. Access to

comprehensive assessment, treatment, case management, and family-support services that are developmentally, culturally, and gender-appropriate is also integral when addressing adolescent addiction.

Medications for substance abuse among adolescents may in certain cases be helpful. Currently, the only addiction medications approved by FDA for people under 18 are over-the-counter transdermal nicotine skin patches, chewing gum, and lozenges (physician advice should be sought first).

Buprenorphine, a medication for treating opioid addiction that must be prescribed by specially trained physicians, has not been approved for adolescents, but recent research suggests it could be effective for those as young as 16. Studies are underway to determine the safety and efficacy of this and other medications for opioid-, nicotine-, and alcohol-dependent adolescents and for adolescents with co-occurring disorders.

Are there specific drug addiction treatments for older adults?

With the aging of the baby boomer generation, the composition of the general population is changing dramatically with respect to the number of older adults. Such a change, coupled with a greater history of lifetime drug use (than previous older generations), different cultural norms and general attitudes about drug use, and increases in the availability of psychotherapeutic medications, is already leading to greater drug use by older adults and may increase substance use problems in this population.

While substance abuse in older adults often goes unrecognized and therefore untreated, research indicates that currently available addiction treatment programs can be as effective for them as for younger adults.

Can a person become addicted to medications prescribed by a doctor?

Yes. People who abuse prescription drugs—that is, taking them in a manner or a dose other than prescribed, or taking medications prescribed for another person—risk addiction and other serious health consequences. Such drugs include opioid pain relievers, stimulants used to treat ADHD, and benzodiazepines to treat anxiety or sleep disorders. Indeed, in 2010, an estimated 2.4 million people 12 or older met criteria for abuse of or dependence on prescription drugs, the second most common illicit drug use after marijuana. To minimize these risks, a physician (or other prescribing health provider) should screen patients for prior or current substance abuse problems and assess their family history of substance abuse or addiction before prescribing a psychoactive medication and monitor patients who are prescribed such drugs. Physicians also need to educate patients about the potential risks so that they will follow their physician's instructions faithfully, safeguard their medications, and dispose of them appropriately.

Is there a difference between physical dependence and addiction?

Yes. Addiction—or compulsive drug use despite harmful consequences—is characterized by an inability to stop using a drug; failure to meet work, social, or family obligations; and, sometimes (depending on the drug), tolerance and withdrawal. The latter reflect physical dependence in which the body adapts to the drug, requiring more of it to achieve a certain effect (tolerance) and eliciting drug-specific physical or mental symptoms if drug use is abruptly ceased (withdrawal). Physical dependence can happen with the chronic use of many drugs—including many prescription drugs, even if taken as instructed. Thus, physical dependence in and of itself does not constitute addiction, but it often accompanies addiction. This distinction can be difficult to discern, particularly with prescribed pain medications, for which the need for increasing dosages can represent tolerance or a worsening underlying problem, as opposed to the beginning of abuse or addiction.

How do other mental disorders coexisting with drug addiction affect drug addiction treatment?

Drug addiction is a disease of the brain that frequently occurs with other mental disorders. In fact, as many as 6 in 10 people with an illicit substance use disorder also suffer from another mental illness; and rates are similar for users of licit drugs—i.e., tobacco and alcohol. For these individuals, one condition becomes more difficult to treat successfully as an additional condition is intertwined. Thus, people entering treatment either for a substance use disorder or for another mental disorder should be assessed for the co-occurrence of the other condition. Research indicates that treating both (or multiple) illnesses simultaneously in an integrated fashion is generally the best treatment approach for these patients.

Is the use of medications like methadone and buprenorphine simply replacing one addiction with another?

No. Buprenorphine and methadone are prescribed or administered under monitored, controlled conditions and are safe and effective for treating opioid addiction when used as directed. They are administered orally or sublingually (i.e., under the tongue) in specified doses, and their effects differ from those of heroin and other abused opioids.

Heroin, for example, is often injected, snorted, or smoked, causing an almost immediate “rush,” or brief period of intense euphoria, that wears off quickly and ends in a “crash.” The individual then experiences an intense craving to use the drug again to stop the

crash and reinstate the euphoria.

The cycle of euphoria, crash, and craving—sometimes repeated several times a day—is a hallmark of addiction and results in severe behavioral disruption. These characteristics result from heroin’s rapid onset and short duration of action in the brain.

In contrast, methadone and buprenorphine have gradual onsets of action and produce stable levels of the drug in the brain. As a result, patients maintained on these medications do not experience a rush, while they also markedly reduce their desire to use opioids.

If an individual treated with these medications tries to take an opioid such as heroin, the euphoric effects are usually dampened or suppressed. Patients undergoing maintenance treatment do not experience the physiological or behavioral abnormalities from rapid fluctuations in drug levels associated with heroin use. Maintenance treatments save lives—they help to stabilize individuals, allowing treatment of their medical, psychological, and other problems so they can contribute effectively as members of families and of society.

Where do 12-step or self-help programs fit into drug addiction treatment?

Self-help groups can complement and extend the effects of professional treatment. The most prominent self-help groups are those affiliated with Alcoholics Anonymous (AA), Narcotics Anonymous (NA), and Cocaine Anonymous (CA), all of which are based on the 12-step model. Most drug addiction treatment programs encourage patients to participate in self-help group therapy during and after formal treatment. These groups can be particularly helpful during recovery, offering an added layer of community-level social support to help people achieve and maintain abstinence and other healthy lifestyle behaviors over the course of a lifetime.

Can exercise play a role in the treatment process?

Yes. Exercise is increasingly becoming a component of many treatment programs and has proven effective, when combined with cognitive-behavioral therapy, at helping people quit smoking. Exercise may exert beneficial effects by addressing psychosocial and physiological needs that nicotine replacement alone does not, by reducing negative feelings and stress, and by helping prevent weight gain following cessation. Research to determine if and how exercise programs can play a similar role in the treatment of other forms of drug abuse is under way.

How does drug addiction treatment help reduce the spread of HIV/AIDS, Hepatitis C (HCV), and other infectious diseases?

Drug-abusing individuals, including injecting and non-injecting drug users, are at increased risk of human immunodeficiency virus (HIV), hepatitis C virus (HCV), and other infectious diseases. These diseases are transmitted by sharing contaminated drug injection equipment and by engaging in risky sexual behavior sometimes associated with drug use. Effective drug abuse treatment is HIV/HCV prevention because it reduces activities that can spread disease, such as sharing injection equipment and engaging in unprotected sexual activity. Counseling that targets a range of HIV/HCV risk behaviors provides an added level of disease prevention.

Drug abuse treatment is HIV and HCV prevention.

Injection drug users who do not enter treatment are up to six times more likely to become infected with HIV than those who enter and remain in treatment. Participation in treatment also presents opportunities for HIV screening and referral to early HIV treatment. In fact, recent research from NIDA’s National Drug Abuse Treatment Clinical Trials Network showed that providing rapid onsite HIV testing in substance abuse treatment facilities increased patients’ likelihood of being tested and of receiving their test results. HIV counseling and testing are key aspects of superior drug abuse treatment programs and should be offered to all individuals entering treatment. Greater availability of inexpensive and unobtrusive rapid HIV tests should increase access to these important aspects of HIV prevention and treatment.

Drug addiction is a complex disorder that can involve virtually every aspect of an individual’s functioning—in the family, at work and school, and in the community.

Because of addiction’s complexity and pervasive consequences, drug addiction treatment typically must involve many components. Some of those components focus directly on the individual’s drug use; others, like employment training, focus on restoring the addicted individual to productive membership in the family and society (See diagram “[Components of Comprehensive Drug Abuse Treatment](#)”), enabling him or her to experience the rewards associated with abstinence.

Treatment for drug abuse and addiction is delivered in many different settings using a variety of behavioral and pharmacological approaches. In the United States, more than 14,500 specialized drug treatment facilities provide counseling, behavioral therapy, medication, case management, and other types of services to persons with substance use disorders.

Along with specialized drug treatment facilities, drug abuse and addiction are treated in physicians' offices and mental health clinics by a variety of providers, including counselors, physicians, psychiatrists, psychologists, nurses, and social workers. Treatment is delivered in outpatient, inpatient, and residential settings. Although specific treatment approaches often are associated with particular treatment settings, a variety of therapeutic interventions or services can be included in any given setting.

Because drug abuse and addiction are major public health problems, a large portion of drug treatment is funded by local, State, and Federal governments. Private and employer-subsidized health plans also may provide coverage for treatment of addiction and its medical consequences. Unfortunately, managed care has resulted in shorter average stays, while a historical lack of or insufficient coverage for substance abuse treatment has curtailed the number of operational programs. The recent passage of parity for insurance coverage of mental health and substance abuse problems will hopefully improve this state of affairs. Health Care Reform (i.e., the Patient Protection and Affordable Care Act of 2010, "ACA") also stands to increase the demand for drug abuse treatment services and presents an opportunity to study how innovations in service delivery, organization, and financing can improve access to and use of them.

Types of Treatment Programs

Research studies on addiction treatment typically have classified programs into several general types or modalities. Treatment approaches and individual programs continue to evolve and diversify, and many programs today do not fit neatly into traditional drug addiction treatment classifications.

Most, however, start with detoxification and medically managed withdrawal, often considered the first stage of treatment. Detoxification, the process by which the body clears itself of drugs, is designed to manage the acute and potentially dangerous physiological effects of stopping drug use. As stated previously, detoxification alone does not address the psychological, social, and behavioral problems associated with addiction and therefore does not typically produce lasting behavioral changes necessary for recovery. Detoxification should thus be followed by a formal assessment and referral to drug addiction treatment.

Because it is often accompanied by unpleasant and potentially fatal side effects stemming from withdrawal, detoxification is often managed with medications administered by a physician in an inpatient or outpatient setting; therefore, it is referred to as "medically managed withdrawal." Medications are available to assist in the withdrawal from opioids, benzodiazepines, alcohol, nicotine, barbiturates, and other sedatives.

Long-Term Residential Treatment

Long-term residential treatment provides care 24 hours a day, generally in non-hospital settings. The best-known residential treatment model is the therapeutic community (TC), with planned lengths of stay of between 6 and 12 months. TCs focus on the "resocialization" of the individual and use the program's entire community—including other residents, staff, and the social context—as active components of treatment. Addiction is viewed in the context of an individual's social and psychological deficits, and treatment focuses on developing personal accountability and responsibility as well as socially productive lives. Treatment is highly structured and can be confrontational at times, with activities designed to help residents examine damaging beliefs, self-concepts, and destructive patterns of behavior and adopt new, more harmonious and constructive ways to interact with others.

Many TCs offer comprehensive services, which can include employment training and other support services, onsite. Research shows that TCs can be modified to treat individuals with special needs, including adolescents, women, homeless individuals, people with severe mental disorders, and individuals in the criminal justice system.

Short-Term Residential Treatment

Short-term residential programs provide intensive but relatively brief treatment based on a modified 12-step approach. These programs were originally designed to treat alcohol problems, but during the cocaine epidemic of the mid-1980s, many began to treat other types of substance use disorders. The original residential treatment model consisted of a 3- to 6-week hospital-based inpatient treatment phase followed by extended outpatient therapy and participation in a self-help group, such as AA. Following stays in residential treatment programs, it is important for individuals to remain engaged in outpatient treatment programs and/or aftercare programs. These programs help to reduce the risk of relapse once a patient leaves the residential setting.

Outpatient Treatment Programs

Outpatient treatment varies in the types and intensity of services offered. Such treatment costs less than residential or inpatient treatment and often is more suitable for people with jobs or extensive social supports. It should be noted, however, that low-intensity programs may offer little more than drug education. Other outpatient models, such as intensive day treatment, can be comparable to residential programs in services and effectiveness, depending on the individual patient's characteristics and needs. In

many outpatient programs, group counseling can be a major component. Some outpatient programs are also designed to treat patients with medical or other mental health problems in addition to their drug disorders.

Individualized Drug Counseling

Individualized drug counseling not only focuses on reducing or stopping illicit drug or alcohol use; it also addresses related areas of impaired functioning—such as employment status, illegal activity, and family/social relations—as well as the content and structure of the patient’s recovery program.

Through its emphasis on short-term behavioral goals, individualized counseling helps the patient develop coping strategies and tools to abstain from drug use and maintain abstinence. The addiction counselor encourages 12-step participation (at least one or two times per week) and makes referrals for needed supplemental medical, psychiatric, employment, and other services.

Group Counseling

Many therapeutic settings use group therapy to capitalize on the social reinforcement offered by peer discussion and to help promote drug-free lifestyles. Research has shown that when group therapy either is offered in conjunction with individualized drug counseling or is formatted to reflect the principles of cognitive-behavioral therapy or contingency management, positive outcomes are achieved. Currently, researchers are testing conditions in which group therapy can be standardized and made more community-friendly.

Treating Criminal Justice-Involved Drug Abusers and Addicted Individuals

Often, drug abusers come into contact with the criminal justice system earlier than other health or social systems, presenting opportunities for intervention and treatment prior to, during, after, or in lieu of incarceration. Research has shown that combining criminal justice sanctions with drug treatment can be effective in decreasing drug abuse and related crime. Individuals under legal coercion tend to stay in treatment longer and do as well as or better than those not under legal pressure. Studies show that for incarcerated individuals with drug problems, starting drug abuse treatment in prison and continuing the same treatment upon release—in other words, a seamless continuum of services—results in better outcomes: less drug use and less criminal behavior. More information on how the criminal justice system can address the problem of drug addiction can be found in [Principles of Drug Abuse Treatment for Criminal Justice Populations: A Research-Based Guide](#) (National Institute on Drug Abuse, revised 2012).

Key Takeaways

- Drug addiction can be treated, but it’s not simple. Addiction treatment must help the person do the following:
 - stop using drugs
 - stay drug-free
 - be productive in the family, at work, and in society
- Successful treatment has several steps:
 - detoxification
 - behavioral counseling
 - medication (for opioid, tobacco, or alcohol addiction)
 - evaluation and treatment for co-occurring mental health issues such as depression and anxiety
 - long-term follow-up to prevent relapse
- Medications and devices can be used to manage withdrawal symptoms, prevent relapse, and treat co-occurring conditions.
- Behavioral therapies help patients
 - modify their attitudes and behaviors related to drug use
 - increase healthy life skills
 - persist with other forms of treatment, such as medication
- People within the criminal justice system may need additional treatment services to treat drug use disorders effectively. However, many offenders don’t have access to the types of services they need.

SAMHSA Guide to MAT Medications, Counseling, and Related Conditions

Medication-Assisted Treatment (MAT) is the use of medications, in combination with [counseling and behavioral therapies](#), to provide a “whole-patient” approach to the treatment of substance use disorders. It is also important to address other health conditions during treatment.

MAT Medications

The [Food and Drug Administration \(FDA\)](#) has approved several different medications to treat alcohol and opioid use disorders. MAT medications relieve the withdrawal symptoms and psychological cravings that cause chemical imbalances in the body. Medications used for MAT are evidence-based treatment options and do not just substitute one drug for another.

Methadone used to treat those with a confirmed diagnosis of Opioid Use Disorder can only be dispensed through a SAMHSA certified OTP. Some of the medications used in MAT are controlled substances due to their potential for misuse. Drugs, substances, and certain chemicals used to make drugs are classified by the [Drug Enforcement Administration \(DEA\)](#) into five distinct categories, or schedules, depending upon a drug's acceptable medical use and potential for misuse. Learn more about DEA [drug schedules](#).

Alcohol Use Disorder Medications – Acamprosate, disulfiram, and naltrexone are the most common drugs used to treat alcohol use disorder. They do not provide a cure for the disorder but are most effective in people who participate in a MAT program.

- **Acamprosate** – is for people in recovery, who are no longer drinking alcohol and want to avoid drinking. It works to prevent people from drinking alcohol, but it does not prevent withdrawal symptoms after people drink alcohol. It has not been shown to work in people who continue drinking alcohol, consume illicit drugs, and/or engage in [prescription drug misuse and abuse](#). The use of acamprosate typically begins on the fifth day of abstinence, reaching full effectiveness in five to eight days. It is offered in tablet form and taken three times a day, preferably at the same time every day. The medication's side effects may include diarrhea, upset stomach, appetite loss, anxiety, dizziness, and difficulty sleeping.
- **Disulfiram** – treats chronic alcoholism and is most effective in people who have already gone through detoxification or are in the initial stage of abstinence. Offered in a tablet form and taken once a day, disulfiram should never be taken while intoxicated and it should not be taken for at least 12 hours after drinking alcohol. Unpleasant side effects (nausea, headache, vomiting, chest pains, difficulty breathing) can occur as soon as ten minutes after drinking even a small amount of alcohol and can last for an hour or more.
- **Naltrexone** – blocks the euphoric effects and feelings of intoxication and allows people with alcohol use disorders to reduce alcohol use and to remain motivated to continue to take the medication, stay in treatment, and avoid relapses.

To learn more about MAT for alcohol use disorders view [Medication for the Treatment of Alcohol Use Disorder: A Brief Guide – 2015](#) and [TIP 49: Incorporating Alcohol Pharmacotherapies Into Medical Practice](#).

Opioid Dependency Medications – Buprenorphine, methadone, and naltrexone are used to treat opioid use disorders to short-acting opioids such as heroin, morphine, and codeine, as well as semi-synthetic opioids like oxycodone and hydrocodone. These MAT medications are safe to use for months, years, or even a lifetime. As with any medication, consult your doctor before discontinuing use.

- **Buprenorphine** – suppresses and reduces cravings for opioids. Learn more about [buprenorphine](#).
- **Methadone** – reduces opioid cravings and withdrawal and blunts or blocks the effects of opioids. Learn more about [methadone](#).
- **Naltrexone** – blocks the euphoric and sedative effects of opioids and prevents feelings of euphoria. Learn more about [naltrexone](#).

Learn more about MAT for [opioid use disorders](#) or download [TIP 63: Medications for Opioid Use Disorder – Introduction to Medications for Opioid Use Disorder Treatment \(Part 1 of 5\) – 2020](#).

Opioid Overdose Prevention Medication – Naloxone saves lives by reversing the toxic effects of overdose. According to the World Health Organization (WHO), naloxone is one of a number of [medications considered essential to a functioning health care system](#).

- **Naloxone** – used to prevent opioid overdose, naloxone reverses the toxic effects of the overdose. Learn more about [Naloxone](#).

Counseling and Behavioral Therapies

Under federal law [42.CFR 8.12](#), MAT patients receiving treatment in OTPs must receive counseling, which may include different forms of behavioral therapy. These services are required along with medical, vocational, educational, and other assessment and treatment services. Learn more about these [treatments for substance use disorders](#).

Regardless of what setting MAT is provided in, it is more effective when counseling and other behavioral health therapies are included to provide patients with a whole-person approach.

Co-Occurring Disorders and Other Health Conditions

The coexistence of both a substance use disorder and a mental illness, known as a co-occurring disorder, is common among people in MAT. In addition, individuals may have other health-related conditions such as hepatitis, HIV and AIDS. Learn more about [co-occurring disorders and other health conditions](#).

Case Management in Addiction

Case management is a coordinated, intentional approach to delivering quality services (SAMHSA, 2015). It requires cooperation among multiple agencies and professionals, awareness of the multifaceted needs of clients, and purposeful collaboration between counselor and client.

In many ways, all addiction professionals take on the role of case manager. This includes doctors, nurses, social workers, licensed counselors, and certified addictions counselors. The reason for this distinction is because of the range of “whole-person” issues discussed throughout this book. Substance use disorder is a primary diagnosis, but it is not an isolated one.

SAMHSA developed a series of treatment improvement protocol manuals (TIPs) designed to provide professionals with expert guidance, and they devoted an entire manual to the importance of case management services (TIP 27). Included in the manual is an overview of the skills that case managers in substance abuse treatment settings need to have:

- Understanding various models and theories of addiction and other problems related to substance abuse
- Ability to describe the philosophies, practices, policies, and outcomes of the most generally accepted and scientifically supported models of treatment, recovery, relapse prevention, and continuing care for addiction and other substance-related problems
- Ability to recognize the importance of family, social networks, community systems, and self-help groups in the treatment and recovery process
- Understanding the variety of insurance and health maintenance options available and the importance of helping clients access those benefits
- Understanding diverse cultures and incorporating the relevant needs of culturally diverse groups, as well as people with disabilities, into clinical practice
- Understanding the value of an interdisciplinary approach to addiction treatment

Chapter Quiz

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

<https://cod.pressbooks.pub/addiction/?p=50>

Screening and Assessment Tools Chart

Tool	Substance type		Patient age		How tool is administered	
	Alcohol	Drugs	Adults	Adolescents	Self-administered	Clinician-administered
Screens						
Screening to Brief Intervention (S2BI)	X	X		X	X	X
Brief Screener for Alcohol, Tobacco, and other Drugs (BSTAD)	X	X		X	X	X
Tobacco, Alcohol, Prescription medication, and other Substance use (TAPS)	X	X	X		X	X
NIDA Drug Use Screening Tool: Quick Screen (NMASSIST)	X	X	X			X

Alcohol Use Disorders Identification Test-C (AUDIT-C (PDF, 41KB))	X		X		X	X
Alcohol Use Disorders Identification Test (AUDIT (PDF, 233KB))	X		X			X
Opioid Risk Tool (PDF, 168KB)		X	X		X	
CAGE-AID (PDF, 30KB)	X	X	X			X
CAGE (PDF, 14KB)(link is external)	X		X			X
Helping Patients Who Drink Too Much: A Clinician's Guide (NIAAA)	X		X			X
Alcohol Screening and Brief Intervention for Youth: A Practitioner's Guide (NIAAA)	X			X		X
Assessments						
Tobacco, Alcohol, Prescription medication, and other Substance use (TAPS)	X	X	X		X	X
CRAFFT(link is external)	X	X		X	X	X
Drug Abuse Screen Test (DAST-10)* <i>For use of this tool – please contact Dr. Harvey Skinner(link sends email)</i>		X	X		X	X
Drug Abuse Screen Test (DAST-20: Adolescent version)* <i>For use of this tool – please contact Dr. Harvey Skinner(link sends email)</i>		X		X	X	X
NIDA Drug Use Screening Tool (NMASSIST)	X	X	X			X
Helping Patients Who Drink Too Much: A Clinician's Guide (NIAAA)	X		X			X
Alcohol Screening and Brief Intervention for Youth: A Practitioner's Guide (NIAAA)	X			X		X

DSM-5 Criteria for Substance Use Disorder

1. The substance is often taken in larger amounts or over a longer period than was intended.
2. There is a persistent desire or unsuccessful effort to cut down or control use of the substance.
3. A great deal of time is spent in activities necessary to obtain the substance, use the substance, or recover from its effects.
4. Craving, or a strong desire or urge to use the substance, occurs.
5. Recurrent use of the substance results in a failure to fulfill major role obligations at work, school, or home.
6. Use of the substance continues despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of its use.
7. Important social, occupational, or recreational activities are given up or reduced because of use of the substance.
8. Use of the substance is recurrent in situations in which it is physically hazardous.
9. Use of the substance is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance.
10. Tolerance, as defined by either of the following:
 1. A need for markedly increased amounts of the substance to achieve intoxication or desired effect
 2. A markedly diminished effect with continued use of the same amount of the substance.

11. Withdrawal, as manifested by either of the following:

1. The characteristic withdrawal syndrome for that substance (as specified in the DSM-5 for each substance).
2. The use of a substance (or a closely related substance) to relieve or avoid withdrawal symptoms.

The Classification of Substance Use Disorders: Historical, Contextual, and Conceptual Considerations

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Abstract: This article provides an overview of the history of substance use and misuse and chronicles the long shared history humans have had with psychoactive substances, including alcohol. The practical and personal functions of substances and the prevailing views of society towards substance users are described for selected historical periods and within certain cultural contexts. This article portrays how the changing historical and cultural milieu influences the prevailing medical, moral, and legal conceptualizations of substance use as reflected both in popular opinion and the consensus of the scientific community and represented by the American Psychiatric Association's (APA) Diagnostic and Statistical Manual of Mental Disorders (DSM). Finally, this article discusses the efforts to classify substance use disorders (SUDs) and associated psychopathology in the APA compendium. Controversies both lingering and resolved in the field are discussed, and implications for the future of SUD diagnoses are identified.

1. Introduction

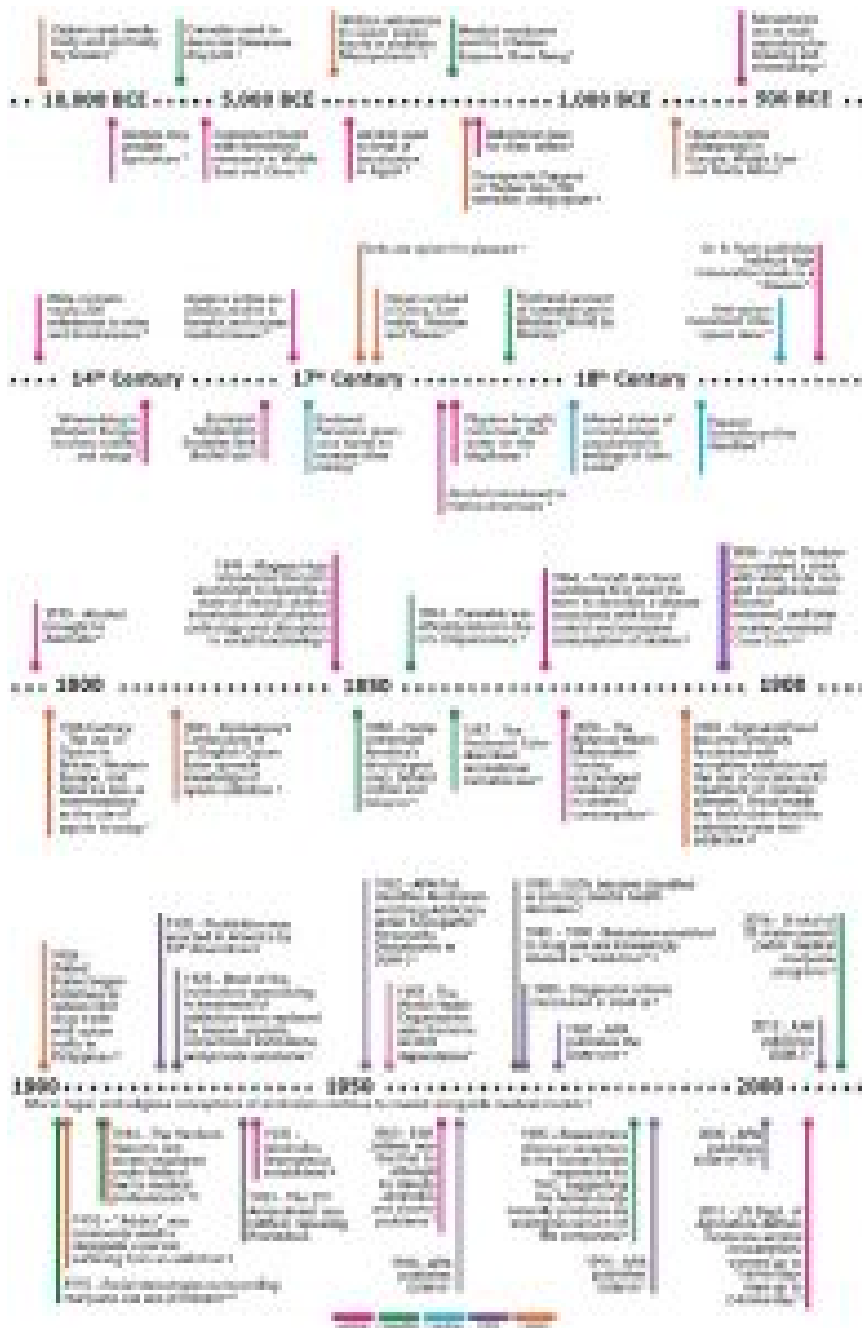
Today, the Diagnostic and Statistical Manual of Mental Disorders (DSM) is regarded as the defining standard for mental health diagnoses (including substance use disorders (SUDs)) in America and increasingly abroad. While the fact that the DSM identifies SUDs as *primary mental health disorders* may be taken for granted today, it is noteworthy that SUDs were, prior to the third publication of the DSM (1980), largely conceptualized as manifestations of underlying primary psychopathology [1]. Thus, a large paradigm shift in SUD nosology is apparent in less than half a century's time. Taking an even longer perspective reveals that, although psychoactive substances (including alcohol) have been around for nearly as long as recorded history, the scientific classification of SUDs only began in the early 19th century. Taken together, these observations suggest that the complex relationships human societies have had with substances over time may provide a rich and valuable backdrop of contextual and conceptual considerations for the eventual rise of nosological science. While it is beyond the scope of this article to provide a well-rounded historical account of the complex history of substance use in its entirety, the general purpose is to provide a historical framework by which the reader can contextualize and therefore better understand those influences which have shaped development of the DSM nosology of SUDs. Because the development of the DSM is singularly tied to cultural and historical developments in both Europe and the United States of America (i.e., "US", "American"), this review takes a decidedly Western-oriented outlook on modern nosology and focuses almost exclusively on the American classification system (i.e., that which is associated with the American Psychiatric Association [APA]). Also of note: consistent with the most recent DSM, this manuscript generally uses the terminology "substance use disorder(s)" to refer to a superordinate category which is comprised of a number of singular disorders (e.g., alcohol use disorder (AUD), cannabis use disorder, etc.). In order to most effectively contrast this modern diagnostic label with earlier conceptualizations, this term is often used alongside and in comparison to earlier terms and labels.

First, a relatively brief historical overview of the long and complicated relationships humans have had with substances is provided, including the historical context of both medical and non-medical use preceding the advent of the modern diagnostic system. In order to provide a detailed yet bounded overview, this review focuses on a number of substances (including their pharmacological progenitors and/or descendants), which have, arguably, played more prominent historical roles (i.e., opium, cannabis, alcohol, cocaine). Second, this article provides demonstrative historical examples of the top-down impact that societal factors have had on substance use and substance use conceptualization and also discusses a number of influences (i.e., cultural, industrial, socio-political) which have impacted the development of the APA compendium. Third, the impact of substance use on society today is discussed in terms of substance use-related costs. Finally, following an account of the development of each version of the DSM, a few of the lingering controversies in the field are identified, and future considerations are discussed for SUD diagnoses specifically and for the addiction field as a whole.

2. Historical Considerations: A Long History of Psychoactive Substances

2.1. Opioids

The history of psychoactive drugs is closely entwined with the lives and histories of the humans that cultivated and used them. Likely one of the first drugs known to humans, opium and its derivatives, have been associated with its human cultivators for millennia (for an in-depth review of the history of opium/narcotics, the reader is referred to Davenport-Hines [2] and Booth [3]). Opium itself (which contains the active opioid alkaloids *morphine* and *codeine*) is derived from a species of poppy flower, *Papaver somniferum* (Latin for “sleep inducing poppy”). Knowledge of the effects of opium in the ancient world most likely originated in Egypt, the Balkans, or the Black Sea, and the substance was obtained through relatively simple harvesting and preparation methods. The promulgation of opium throughout Persia, India, China, North Africa, and Spain by Arab traders allowed for the quick spread of the drug throughout the ancient world, leaving behind well-known written records of its properties and uses. One written account believed to reference an opium concoction, known as *nepenthe*, takes place in Homer’s *The Odyssey*, where he gives an account of “a drug that had the power of robbing grief and anger of their sting and banishing all painful memories.” This mixture may refer to opium and alcohol, a mixture later known as laudanum. Figure 1 provides additional points of historical reference. Advancing to more recent times, it was in the 19th century that experimentation with morphine for non-medical purposes by Europeans increased while physicians concurrently came to recognize the negative effects of the drug—especially with regards to prolonged medical use.



2.2. Cannabis

Evidence of cannabis (a.k.a. marijuana, hemp) use dates back tens of thousands of years in both Europe and Taiwan. For detailed reviews on the history of cannabis, the reader is referred to Abel [24], Earleywine [5], Grinspoon and Bakalar [7], and Lee [9]. Although cannabis originated in Afghanistan, it was cultivated in Europe, Arabia, France, Asia, and North and South Africa, and its use was common in the cultures comprising the modern day nations of China, Japan, India, and others. The widespread cultivation of the plant was largely due to its ability to make rope and textiles and its fibers, and was purportedly used in the creation of paper in China and Japan in the 2nd and 5th centuries A.D., respectively [25,26]. The popularity of the plant was also due to its use as a medicine; its pain-relieving properties were well known in ancient China and recorded in pharmacopeias dating back to the 1st century A.D. The historical use of cannabis in the treatment of medical illness has also been documented by the ancient people of India, who used cannabis preparations to treat headaches, dysentery, and venereal disease [2]. In ancient China cannabis was used to ease the pain associated with surgery, in Japan it was used to drive away the evil spirits believed to be the

cause of illness, and among the ancient Greeks it was believed to be a cure for earaches and to reduce sexual desires [24]. In 17th and 18th century Europe the use of cannabis for its purported antibiotic and analgesic effects became common and it was recognized as a sedative/hallucinogen. In India, cannabis preparations in a variety of forms were used recreationally, including *bhang*, *ganja*, and *charas* (i.e., *hashish*). As seen in Figure 1, the use of cannabis continued over time, partly as a folk remedy for a number of ailments. While its use as a recreational drug eventually became more widespread, it was not until the mid-19th century that interest in the medicinal properties of the drug once again became popular. In the US around this time, exposure to recreational use of the drug was limited to a relatively small number of individuals [5].

2.3. Cocaine

Although the history of cocaine itself is relatively short compared to the coca plant from which it is derived, both substances have a longstanding place in history (for reviews on the topic, the reader is referred to Davenport-Hines [2] and Karch [27]). Cocaine is one of the alkaloids contained in the leaves of the coca plant (*Erythroxylum coca*), which has grown wild for thousands of years in what currently comprises the countries Colombia and Bolivia. The alkaloids were used by native peoples in modern-day Peru for thousands of years to reduce hunger and thirst and to increase energy through the chewing of coca leaves. In addition to the functional utility of the leaves, they were also considered sacred by the Peruvian Incas and were used ritualistically in worship of the divine. Because the plant is cultivated under hot and humid tropical climates, it was not grown in Europe until the 1700's, when heated greenhouses became available. In the mid-19th century, cocaine was isolated as the active ingredient in the coca leaf in Europe and cocaine was extolled by both American pharmaceutical companies as well as some notable figures in the medical community for its non-addictive qualities and its potential usefulness in weaning people off the dangerous "morphine habit" (see Figure 1 for additional selected historical events). Although cocaine is famously known for being included in popular beverages in the late 19th century, the idea of cocaine as a non-addictive panacea-like wonder-drug was short-lived and since then cocaine has been employed with increasing rarity in medicine. Today, it is most commonly used by otolaryngologists as a local anesthetic with vasoconstrictive properties [28,29].

2.4. Alcohol

Alcohol, along with opium, is probably one of the first psychoactive substances used by man and remains one of the most widely used recreational substances. Today, the non-pathological use of alcohol today is typically associated with festivity, leisure, and recreational activities, and history is replete with examples of practical and functional uses of alcohol dating back to antiquity (for detailed explications of this history see Sournia [6], Davenport-Hines [2], and White [8]). Beer and wine, for example, are believed to have been important resources for the Ancient Egyptians, with pictographs from around 4000 BCE depicting Egyptians using the substance for medicine and nutrition as well as for religious and other cultural practices. Consumption of alcohol was also pervasive throughout all segments of ancient Chinese society and its sale also provided major sources of revenue for the empire. The use of alcohol became widespread in a number of religious and cultural practices such that an imperial edict was issued stating that "moderate consumption was a religious obligation" [4]. The word *alcohol* (from the Arabic word *al-kuhl*) came to mean an essential property or spirit of something, and the mysterious properties of the substance became associated with transcendental and therefore religious experiences in a number of cultures [6,8]. The association of alcohol with religion and the divine was also common among the ancient Babylonians and the area that is now Greece. With the exception of all but a few Native American and Australian native tribes (for whom alcohol was largely non-existent prior to the arrival of Europeans), alcohol was continually consumed in large quantities throughout much of the known world. In 13th century England, as knowledge of the brewing process spread, ale became both a dietary staple for children and adults alike as well as a commodity for commerce. Alcohol use was also prominent during the renaissance and in beer was a staple of the early economy in America [2].

Along with its functional uses, alcohol was used in the ancient world, as it is today, as an intoxicant. One early account of excessive alcohol intoxication is found in the cult of Dionysus, a religious sect, which held to the idea that intoxication brought worshippers closer to their god. Indeed, consumption of alcohol, particularly wine, was so central to Greek culture that abstinence was frowned upon and wine consumption was considered a civic duty in Athens [2]. Despite the central role of alcohol in Greek society, Greeks promoted moderate drinking and reproached intoxication, with some exceptions. Similar to the Greeks, the Romans also considered wine to be central to their society and placed a high value on moderation. The decline of moderation and the rise of excessive consumption, however, began after the third century BCE, as the Roman Empire continued to spread and eventually began its period of decline [2]. As the influence of the Romans declined, so did the influence of the Christian religion rise. The growing power of the Church would exert an influence over attitudes towards drinking and intoxication for nearly two thousand years. See Figure 1 for additional selected historical events involving alcohol.

3. Cultural and Contextual Considerations

3.1. Societal Influences on Attitudes and Perceptions of Substance Use

Over time, a number of influences (i.e., religious, cultural, industrial, and sociopolitical) can be seen to impact attitudes and perceptions of substance use among both professionals and the laity alike. These attitudes and perceptions, enmeshed with the prevailing cultural zeitgeist of the time, have considerable impact across a number of domains, including interest in and funding towards treatment, the legal status/criminalization of substance users, substance use itself, as well as professional conceptualization and psychiatric nosology. A selected few of these influences are described below.

3.1.1. Religious Influences

Historically speaking, the beliefs and practices of the Christian religion, for one, provided both support for the consumption of wine and also warned against excessive use [4]. Indeed, while the church held largely favorable views regarding the consumption of alcohol in moderation, it also considered over-indulgence to be a sin. According to Hanson [4],

Paul the apostle considered wine to be a creation of God and therefore inherently good and recommended its use for medicinal purposes but condemned intoxication and recommended abstinence for those who could not control their drinking [4] (p. 3).

The Bible itself contains nearly two thousand references to vineyards and wine, and numerous references to drinking that both condemn its use in excess and extoll its virtues in moderation [6]. As alcohol consumption remained high in colonial America, the abuse of alcohol came to be considered a sin by the church and was increasingly condemned by society [8]. The temperance movement of the late 19th century, which [30] describes as one of evangelical “moral absolutes”, left little room for consideration of moderation [30]. The movement sought to cement its cause in morality and set forth a number of arguments designed to reconcile the absolutist beliefs of the temperance movement with a number of positive references to wine in the bible (e.g., wine’s association with Jesus at the Marriage at Cana, the transfiguration of wine at communion). Although prohibition was enacted and eventually repealed, the characterological and moral problems believed to be associated with the sinful vice of excessive alcohol consumption remained. One sign, perhaps, of the perseverance of such beliefs was the groundswell of the post-prohibition grassroots self-help group, Alcoholics Anonymous, founded in 1935 on the belief that alcoholism represented a medical disease worthy of professional attention and not societal enmity. The group simultaneously upheld the beliefs that alcoholism was both (a) a medical disease; and (b) that treatment for this disease was best accomplished through a “*moral inventory, confession of personality defects, restitution of those harmed, and the necessity of belief in and dependence upon God*” [31, 32]. Today, the organization boasts more than 2 million members worldwide [33].

3.1.2. Cultural Influences

As the field of mental health has come to recognize that the process of human development is inexorably linked to and fundamentally shaped by the environment in which we are enmeshed, so, too, is the ever-unfolding process of conceptualizing substance use shaped by the habits, beliefs, and traditions of the larger society. Top-down cultural influences can be seen to exert notable effects on substance use and perceptions of substance use, particularly in the 19th century. The culturally bound perception of morphine addiction of the Victorian age, for example, was enmeshed with the highly restrictive sexual attitudes towards women characteristic of the era (the same era in which psychoanalysis rose to prominence). Due to the drug’s well-known effect on decreasing libido, for example, opium was often prescribed to women for the treatment of neuroses, hysteria, and hypochondriacal disorders; all of which were linked to sexual desires and frustrations among women [34,35]. Thus, the integration of societal standards regarding female sexuality into the mental health profession and diagnostic nomenclature is representative of the way in which the cultural zeitgeist at any given time can influence, if not directly promote, the misuse of substances. With the decline of the Victorian-era, cultural norms shifted, psychiatric diagnoses were re-conceptualized, and female sexuality became less restrained/is no longer treated in a ubiquitously pathological manner.

3.1.3. Industrialization

The influence of industrialization upon the attitudes and perceptions of substance users is readily apparent as America progressed into the industrial revolution. The rapid change from an agricultural to an industrial economy during this time was largely a result from the establishment of the factory system, where labor was carried out by individuals in a centralized location on a large scale [36]. The already negative view of excessive consumption became magnified as society came to rely heavily upon individual personal characteristics incompatible with intoxication—namely productivity, reliability, and punctuality [4]. This was coupled with a shift in the national zeitgeist towards values consistent with the engine of the new economy, including the accumulation of materials and personal wealth. The growing antipathy surrounding the use of alcohol and substances fueled the conceptualization of the “addict” as an unproductive social outcast. Such views were only strengthened by the concomitant rise of problems typically associated with industrialization and urbanization such as increased crime, poverty, and infant mortality rates [2,4]. Furthermore,

the already negative perception of “addicts” became enmeshed with moral judgment; “*Addicts were represented as self-tormenting devils lost in eternal damnation . . . plagued by a ‘diseased soul’*” [2] (p. 63). The near inexorable link between criminal behavior and substance use had thus been influenced by the economic concerns and industrial needs of the world’s largest burgeoning economy.

The effects of industrialization on substance use were not limited solely to alcohol, wherein excessive consumption was antagonistic to the zeitgeist of the times. Harkening back to the provision of coca leaves by the Spanish Conquistadors to the Peruvian slaves in order to increase mining of silver, the modern day equivalent of the coca leaf, cocaine, was supplied by American industrialists and plantation owners to black construction and plantation workers to increase productivity (see Figure 1). Nonetheless, the association of the drug with racial minorities resulted in racialized, zealous accounts of minorities (i.e., “*negro cocaine fiends*”) driven mad by the drug, whose use resulted in acts of murder and/or sexual depravity; not surprisingly, public disapproval of the drugs soon followed [2,37]. The propagation of such attitudes of disapproval across various strata of society would play a principal role in criminalization of substance use (including, most notably, the Temperance Movement and Prohibition). The socio-political American Temperance Movement (1817) coincided with the increasing religious and moral condemnation of alcohol use as detrimental to religious ideals and values related to family and society [4].

4. Legality and Morality Recreational drug use began to be stigmatized as “socially offensive” with records referencing opium as “*the pernicious drug*” around 1814, and drug users were depicted in medical case studies and referenced as being “*incapable of self-control*” from a “*self-inflicted, self-purchased curse*” with “*no happy earthly end*” [2] (p. 62). Due to the widespread use of narcotic medications to treat wartime injuries, societies around the world found a rise in the number of addicted individuals following the American Civil War (1861–1865), the Austro-Prussian War (1866), and the Franco-Prussian War (1870–1871). Despite the growing moral intolerance of substance users, with the exception of a few US cities in the 1870’s, the possession of drugs for non-medicinal use was not a criminal offense until the early 20th century [5]. Like cocaine, cannabis became highly stigmatized in America due to its association with racial minorities and impoverished workers and, by the mid 1890’s these substances became relegated to the category of “vice” associated with criminals and the lower class. A series of laws were enacted starting in the early 20th century which criminalized the distribution of cocaine [27]. As motor vehicles became increasingly common in American early 20th century, research into the metabolic effects of alcohol on driving impairments increased, and the newfound dangers posed by alcohol intoxication took on additional costs to society [15]. As the temperance movement drew strength in industrialized America, so too did it influence attitudes abroad, with prohibition enacted in Russia (1916–1917), Hungary (1919), Norway (1919–1927), Finland (1919–1932) and the United States (1920–1933), among others [4]. Attitudes towards drug use and the increasing costs to a newly industrialized society resulted in widespread legislation designed to restrict their possession and distribution which in turn resulted in the criminalization of substance use and the entrenched association of addiction with crime, an association which has persisted (even within the mental health field). For over 30 years until its most recent iteration, the DSM has included references to legal problems as part of the criteria for SUDs (see Section 7.2).

5. Modern Developments

5.1. Opioids

In the last several decades, substantial advances in pharmacology have led to the identification of endogenous G-protein coupled opioid receptors and the use of synthetic opioids (e.g., methadone, fentanyl) and opiates (e.g., heroin, oxycodone) has proliferated, greatly increasing the amount of drugs manufactured and distributed in the United States and also abroad [38,39]. Due to their potent analgesic effect, opiate drugs have been increasingly used over the past 20 years by physicians in the treatment of chronic pain. There is a growing acceptance, however, that the long term benefits of opiates for the treatment of chronic pain are limited by analgesic tolerance, worsening of pain, the development of an opioid use disorder in those in whom the opiates were initially prescribed for chronic pain. Additionally, the diversion of prescription opioid medication is believed to have resulted in increased illicit use stemming from the subjective reduction in anxiety, mild sedation, and sense of well-being or euphoria induced by consumption of these drugs [38,39]. In 2010, about 12 million Americans (age 12 or older) reported nonmedical use of prescription painkillers during the past year, with nearly a million emergency department visits associated with prescription painkillers with an associated cost to health insurers of 72.5 billion dollars a year [40]. In 2014, over 18,000 deaths have been attributed to overdose from prescription opioid pain relievers, in addition to those associated with their illicit counterpart, heroin [41]. Today, there is increasing recognition on a national level in the U.S. of the problems associated with overuse of opioids.

5.2. Cannabis

Relatively recent advances in our understanding of the pharmacology of cannabis has led to the identification of its active ingredient, chemicals collectively termed *cannabinoids*, including *tetrahydrocannabinol* (THC), the chemical most associated with

psychotropic effects [42]. Federal Drug Administration (FDA) approved synthetic cannabinoids are now available for the treatment of nausea/vomiting associated with chemotherapy and weight loss/loss of appetite associated with cancer and HIV/AIDS. The last several decades have also seen an unprecedented rise in physician approved marijuana use for the treatment of medical conditions in a growing number of American states [42]. Despite these advances, in 2014, it is estimated that 22.2 million Americans aged 12 or over were current users of marijuana, with 4.2 million meeting criteria for a marijuana use disorder [43].

5.3. Cocaine

The pharmacological properties of cocaine and related drugs are now well known and its effects on behavior are primarily attributable its effect on the neurotransmitter dopamine [28,44]. Cocaine, coca leaves, and ecgonine are presently listed as Schedule II substances by the Drug Enforcement Administration [45]. In 2014, it is estimated that 1.5 million Americans age 12 or older were current uses of cocaine (including crack cocaine), with 913,000 meeting criteria for a cocaine use disorder [43].

5.4. Alcohol

Alcohol is now largely used as a ritualistic and recreational intoxicant. In contrast to most illicit psychoactive substances, the health consequences of alcohol use are recognized as occurring on a continuum in which the level of potential harm is relative to the amount and pattern of an individual's consumption. For example, while excessive use of alcohol remains the third preventable leading cause of death in the United States and contributes to over 200 diseases and health related conditions, there is also a growing recognition of the potential benefits of moderate drinking, including decreased risk of diabetes, ischemic stroke, risk heart disease and related mortality [21,46]. In 2014, slightly more than half (52.7 percent) of Americans reported current use of alcohol, with 6.4 percent of people age 12 or older having a past-year AUD [43].

6. Modern Classification of Substance Use Disorders: The DSM

6.1. DSM-I: 1952

After World War II, following the decline of German influence on psychiatric nosology, the center of psychiatry shifted to the United States and the APA commissioned its constituents to create its own psychiatric nosology [11,47]. In 1952 the first DSM (DSM-I) [14] was based upon an expanded nosology used by the United States Army created by psychoanalyst William Menninger (brother to Karl Menninger) [47,48]. Evidence of the influence of psychoanalysis and the psychosocial model in the DSM-I are evident with its observable emphasis on *psychoneurosis* and functional *reactions* to environmental stressors [11,47]. The first DSM conceptualized substance use disorder (i.e., “drug addiction” and “alcoholism”) as most commonly arising from a primary personality disorder (see Table 1) [14]. Although DSM-I conceptualized the etiology of substance use disorder as a symptom of a broader underlying disturbance, it did leave some room for exceptions—at least in coding. For example, in the case of alcoholism, the DSM did allow for a primary diagnosis of SUD when “*there is a well-established addiction to alcohol without recognizable underlying disorder*” [14]. Similarly, for drug addiction, the diagnostic label could be given “*while the individual is actually addicted*” with the “*proper personality classification to be given as an additional diagnosis*” [14]. That these exceptions were noteworthy exemptions, and not the rule, however, speaks to the strength of the etiological conceptualization of SUD as being *secondary to*, or *arising from* a primary personality disorder.

6.2. DSM-II: 1968

In 1959, only seven years after the publication of DSM-I, major advances in the treatment of mental disorders (i.e., the introduction of effective pharmacologic treatments) occurred in the field and, following the lead of the World Health Organization (1951), the American Medical Association (1965) recognized the severity of alcoholism and declared it to be a medical disorder. This further emphasized the need for a classification system based on the medical model [11,47,49]. The publication of the DSM-II [16] however, did little to change the influence of psychoanalysis and its characteristic descriptions of disorders described in the DSM-I. Interestingly, while the DSM-I and DSM-II did not employ diagnostic criteria as we understand them today, the DSM-II did encourage separate diagnoses for alcoholism and drug addiction “*even when it begins as a symptomatic expression of another disorder*” [40]. As seen in Table 1, three recognized types of alcoholism were recognized in DSM-II: (a) episodic excessive drinking (intoxication four times per year); (b) habitual excessive drinking (given to alcoholic persons who become intoxicated more than 12 times a year or are recognizably under the influence of alcohol more than once a week, even though not intoxicated); and (c) alcohol addiction (defined in terms of dependency, suggested by withdrawal which may be evidenced by inability to abstain for one day or heavy drinking for three months or more) [16]. Although withdrawal was emphasized for Drug Addiction, it was also recognized that dependence could occur without withdrawal (a point of semantic confusion which would follow the DSM until its most recent publication). Medically prescribed drugs were excluded in that they were taken in proportion “to the medical need” [16].

6.3. DSM-III: 1980

In keeping with the growing need for a valid and reliable diagnostic compendium for clinicians and researchers alike, the third edition of the DSM (DSM-III) [1] broke with psychoanalytic tradition and instituted consensus based diagnoses and diagnostic criteria [47]. These criteria, including those for SUDs, were based on the Research Diagnostic Criteria (1978) which were, in turn, influenced by the Feighner criteria (1972) [50] and earlier diagnostic attempts by Jellinek [15] to classify alcoholism. The DSM-III also saw the addition of new diagnoses (e.g., Post-traumatic Stress Disorder, Attention Deficit Disorder) and the use of consensus-based diagnoses and diagnostic criteria which, although unremarkable today, were novel concepts at the time [51]. The DSM-III is thus considered a major milestone in the field, reflecting a reemergence of the medical model and the rise of research investigators as the most prominent voices within the field [35,36].

In terms of SUDs, it is notable that the new iteration appeared devoid of the term “alcoholic” and continued the trend of separately diagnosing SUDs by now setting them apart from other mental health conditions (see Table 1). While, for the first time, this version of the DSM explicitly acknowledged differences in cultural perspectives on the acceptability of substance use, it also attempted to anchor the diagnostic criteria in terms of behavioral changes “almost all subcultures would view as extremely undesirable” [1]. Starting in DSM-III, the categories of Substance Abuse and Substance Dependence were adopted, and, although little explicit explanation is offered within the manual as to the basis for adopting this distinction, it seems that the former was equated with *pathological use* (e.g., social or occupational consequences, including legal problems which may arise from car accidents due to intoxication) and the later with *physiological dependence* (i.e., tolerance or withdrawal) [51]. While the rationale behind the DSM-III’s creation of these two categories was not described in the manual, there are a number of criticisms of this paradigm by individuals ultimately tasked with subsequent DSM revisions. Among other things, they stated that the distinction between “abuse” and “dependence” is made entirely on the basis of evidence for the presence of physiological tolerance or withdrawal . . . [which leaves the current system] vulnerable to powerful, swiftly changing social forces such as the tightening of laws restricting alcohol use while driving. Thus, for example, actions of a legislature in a particular state can determine the number of residents who met DSM-III criteria for a mental disorder (i.e., alcohol abuse) [52].

Such criticisms would form the basis for recommendations to alter these categories in the next iteration. Interestingly, some notable irregularities existed *within* the DSM-III. For example, the manual made the explicit *additional* requirements of a pathological use criterion for Alcohol and Cannabis Dependence diagnoses in addition to the main physiological criterion; the manual also stated that data was lacking in support of the main physiological criterion necessary for a Cannabis Dependence diagnosis, i.e., “the existence and significance of tolerance with regular heavy use of cannabis are controversial” [1] (p. 176). Furthermore, while Cocaine Abuse was a recognized diagnosis, Cocaine Dependence was not included “ *since only transitory withdrawal symptoms occur after cessation of or reduction in prolonged use* ” [1] (p. 173).

6.4. DSM-III-R (1987)

While the third edition of the DSM reflected, up to this point, the most profound changes in conceptualization of psychiatric nosology since its inception, its successor, the DSM-III-R also evidenced important changes. One such change was DSM-III-R’s inclusion of criterion items formerly associated with Abuse (i.e., aspects of pathological use) in the Dependence category. By grouping (pathological) behavioral dysfunctions with physiological processes in a polythetic diagnostic set, the conceptualization of the new Dependence category stood in contrast to earlier view that physiological symptoms were both necessary and sufficient for a dependence diagnosis. The DSM-III-R goes even further in separating physiological dependence from the diagnosis of Dependence, explicitly stating that “*surgical patients [who] develop a tolerance to prescribed opioids and experience withdrawal symptoms without showing any signs of impaired control over their use of opioids*” are not considered to fall in the category of Substance Dependence [17,53].

In examining the question of how such a change came about, the reader is referred back to the conceptual validity critiques of the Abuse/Dependence diagnostic sets described in the previous section. In light of these and other conceptual validity problems, recommended revisions to the DSM-III-R included elimination of the Abuse category and incorporation of elements into a newly expanded Dependence category [52]. Such a large conceptual change, they argued, would be consistent with the influential model of a *dependence syndrome* set forth in 1976 by Edwards and Gross which described a *clinical syndrome* of alcohol dependence that was comprised of physiological dependence on one axis and pathological use/behavioral consequences on the other axis of a *singular disorder* [54]. The recommendation to expand the Dependence criteria while removing the Abuse category offers some justification for the integration of the pathological use criterion into the Dependence category and the reversal of the DSM-III stance that physiological use was, in most cases, the hallmark of the disorder. As the DSM-III-R ultimately retained the Abuse category, this re-conceptualization of the mental health disorder never fully took shape. One admitted disadvantage to the re-

conceptualized single disorder model was the potential for diagnostic abandonment of individuals with lower level problems who did not meet the criterion for the would-be expanded Dependence category [52]. Although possible coding schemes were set forth to circumvent this potential problem with the removal of the Abuse diagnosis [52], some suspect the pragmatic fears of diagnostic abandonment superseded validity concerns and ultimately left the Abuse category intact while at the same time advancing the *dependence syndrome's biaxial concept* . . . albeit solely within the Dependence diagnosis [55].

6.5. DSM-IV (1994), DSM-IV-TR (2000)

As the science of mental health continued to progress, the Abuse and Dependence categories were shown to have significant limitations, including: differences in reliability and external validity, incorrect assumptions about the relationship between abuse and dependence, and the problem of “diagnostic orphans” (individuals with symptoms for whom neither diagnosis was met) [56]. The DSM-IV attempted to clarify earlier inconsistencies regarding the distinction between physiological dependence and Substance Dependence by specifying that “Neither tolerance or withdrawal is necessary or sufficient for a diagnosis of Substance Dependence” and added specifiers “With” and “Without Physiological Dependence” [19]. The DSM-IV-TR makes a number of other relatively minor revisions to the Substance Use Disorders and highlights that, compared to Substance Dependence, “*the criteria for Substance Abuse do not include tolerance, withdrawal, or a pattern of compulsive use and instead only the harmful consequences of repeated use*” [20].

6.6. DSM-5: 2013 (See Also Section 7)

The fifth and most recent iteration of DSM (DSM-5) [22] represented the most dramatic modifications since DSM-III with the removal of the Abuse-Dependence paradigm and important revisions to the diagnostic criteria themselves. Most notably, DSM-5 combines Abuse and Dependence into a single unified category and measures severity on a continuous scale from mild (2–3 symptoms endorsed), moderate (4–5 symptoms endorsed) and severe (6 or more symptoms endorsed) out of 11 total symptoms (versus the previous 7) (see Table 1). The shift to a unified category measured along a dimension of severity represents a notable change from the *post-hoc* categorical *severity specifiers* in the previous version and also further cements the difference between the now defunct *DSM diagnosis of Dependence* and the medical concept of *physiological dependence*, a distinction which had been increasingly emphasized over time. As reported in Hasin, *et al.* [57], a number of empirical considerations supported this change, including psychometric studies reporting the uni-dimensionality of the biaxial abuse/dependence paradigm across a number of populations. These empirical findings suggests that, contrary to the categorization of abuse and dependence as more-or-less distinct entities with different severity levels, the criterion items actuality represent a single continuum-of-severity construct. The integration of dimensional elements of classification seen here in SUD also mirrors the call for such an approach among a number of other categorical diagnostic classifications [58–60].

Other noteworthy changes in the DSM-5 were the addition of the *craving* criterion, the removal of the *legal problems* criterion, and the title of the chapter, which now reads “Substance-Related and Addictive Disorders” (despite the use of the term *addiction* in the title, the text reveals that “. . . the word [addiction] is omitted from the official DSM-5 substance use disorder diagnostic terminology because of its uncertain definition and its potentially negative connotation” [22]). The chapter also, for the first time, includes a behavioral addiction (i.e., Gambling Disorder), suggesting that a behavioral addiction has a shared underlying neurological reward systems and a compatible symptom set with SUDs [22]. These changes (i.e., craving criterion addition, legal problems criterion elimination, and the introduction of behavioral addictions) are further discussed in the section below.

7. Discussion

7.1. Potential Practical Implications of Atheoretical Nosology

While the departure from psychoanalytic etiology and adoption of atheoretical consensus based diagnostic entities in the DSM-III is regarded as one of the greatest advances in the field over the last century, the fact that the definitive manual for the diagnosis of mental disorders provides no known etiology or pathophysiology and relies, instead, on defining a disorder by its symptoms may pose a challenge not only for the field in general but for the treatment of SUDs more specifically. One way in which atheoretical classification may prove problematic is the actual clinical usage of the diagnostic criteria themselves. While in vivo studies of clinician usage of DSM-5 for substance use disorder have yet to be carried out beyond the routine clinical practice field trials, past research comparing clinical psychiatric diagnosis versus vs. structured clinical interviews revealed significant disparities in diagnoses among providers for the same patient [61]. According to a review by First *et al.* [61] these and other results suggest that clinicians “*were most likely making DSM diagnoses using a method other than by evaluating each of the diagnostic criteria in sequence*” [61] (p. 842). This observation raises several points of consideration. First, while there are substantial benefits in utilizing consensus-driven standardized diagnostic criteria (e.g., increased reliability and validity of diagnoses, communication

between providers) these benefits are significantly curtailed if clinicians do not actually adequately employ the criteria as intended. Second, while more research is needed in order to determine precisely how clinicians are arriving at diagnoses if not utilizing full diagnostic criteria, cognitive research into the clinical reasoning of clinical psychologists suggests that experienced practitioners still rely on their own particular *causal* theoretical conceptualizations despite the *atheoretical* diagnostic criteria that have been in place for well over thirty years [62]. Thus, the same lack of universally recognized etiology that was the impetus to move beyond the early psychoanalytic influence and advance to a more valid and reliable model may run contrary to innate mechanisms for conceptualizing diagnostic entities among individual providers.

Given the necessity of the diagnostic agnosticism of the DSM and the substantial benefits this model provides to both clinicians and researchers when used correctly, the question arises as to what contributions does the particular state of psychiatric nosology today have on the field as a whole and for SUD specifically? The adoption of a consensus-based symptomological approach might represent the lack of a shared etiology among professionals. Indeed, some of the major controversies (e.g., natural recovery and the disease model, abstinence and moderation/harm reduction approaches) in the field of substance use over the last several decades have inspired protracted debate [63–65] and may very well epitomize this lack of etiological consensus. Today, while the DSM continues to retain its etiological neutrality, the field of substance use has undoubtedly moved in the direction of explicitly emphasizing biological and disease model conceptualizations of addictive behaviors. While advocates of a strict disease model of pathology underlying SUDs point out important achievements including improved recognition of the neurobiological process involved in addiction as well as new pharmacotherapies for treating addiction [66], this conceptualization is still, today, not without its detractors [67,68].

One potential manifestation of this lack of unified etiology or conceptually-driven nosology is the “scientist-practitioner gap”, noted in the field as a whole [69–72] and in the treatment of SUDs. Within SUD treatment, this gap is exemplified in the hesitancy among some practitioners and training programs to readily adopt and promote Evidence-Based Practices (EBPs) in favor of empirically unsupported alternative approaches. Differences in support for and knowledge of the effectiveness of EBPs has been shown to be related to provider level of education, institutional culture, provider type, training, academic affiliation [73–76] and, despite the effectiveness of both psychosocial and pharmacological EBPs, research has shown that their widespread adoption has remained challenging, if not controversial, in some arenas [61]. Specifically, despite increasing availability of effective pharmacologic agents and reductions in cost associated with prescription medication for SUDs, adoption of these practices are slow [77], with “considerable variation in adoption across publicly funded non-profit, government-owned, privately funded non-profit, and for-profit treatment centers” [78] (p. 164). In addition to such macro-influences, individual provider attitudes and beliefs may be another link between conceptualization of SUDs and use of EBPs, with providers with higher responsibility-focused conceptualizations of addiction holding more negative views of the use of naltrexone in the treatment of AUD [79]. Interestingly, the use of pharmacotherapies is particularly low for SUDs (i.e., AUDs) when compared to substantially higher rates of prescribing for other comorbid mental health conditions (e.g., schizophrenia, bipolar, post-traumatic stress disorder) [80], a phenomenon which might suggest larger conceptual differences among SUD providers when compared to other mental health conditions.

7.2. Removal of Legal Problems Criterion

One of the significant DSM-5 changes identified above (Section 6.6) is the removal of the legal problems criterion for Substance Use Disorders. The removal of the legal problems criterion was reported to reflect the low prevalence for endorsement of this item in the general population, as well as poor fit with other criteria, and little added information based on item response theory (IRT) and differential item functioning analyses [81–83]. In contrast to simple summations of items endorsed by an individual in determining an outcome (i.e., level of severity), IRT is used to estimate the level of information provided by a particular item and its utility in predicting that outcome [84]. The data gathered from these models suggests that legal problems were the least associated with the overarching construct when compared to the other items and model fit was actually improved when the legal problems criterion was omitted [82]. Thus, while the removal of this criterion was accomplished through the impartiality of advanced empirical models, as described above, the significance of the departure of the tradition of using the legal problems criterion as a diagnostic criterion reveals the ways in which even a purportedly *atheoretical* nosology can be influenced by specific contexts and cultural changes. This point becomes particularly salient when we consider the original contextual factors (e.g., racism, industrialization) which came together in the 19th century to make the use of certain substances illegal, thereby forming the nearly inexorable link between criminality and substance use which has persisted over time despite its questionable utility in describing SUD. The historical example of the use of opium-based drugs on women from the not-so-distant Victorian age past illustrates the powerful enmeshment of legality, medical acceptance, and cultural norms that remain so saturated in the culture of the time that they remain DSM effectively invisible. Only with the benefit of time do these cultural factors reveal themselves, and, while

the example of the influence of Victorian-era cultural factors on the diagnosis and treatment of mental health in women may seem part of psychiatry's remote past, the influence of culture on nosology can be readily witnessed even in modern times.

Although not substance-related, perhaps the most salient example of social norms affecting diagnosis in recent history is the diagnostic evolution of homosexuality in the DSM which was, much like early conceptualization of SUD, considered a symptom of a real psychological illness (i.e., sociopathic personality disturbance) [85,86]. Following the advent of the LGBT rights movement in the 1960s and subsequent research into the condition, the APA eventually reversed its stance on the issue and today it is recognized that the pathology of sexual behavior (which was, in part, justified by the subjective level of disturbance it caused) is related not to an underlying pathology but rather to socially accepted norms and stigmatization. Consequently, homosexuality is no longer considered a disease or a representation of underlying personality disturbance and is conceptualized from a non-pathological viewpoint (and indeed labeled differently in order to avoid the long-held stigma associated with the term *homosexual* [87]). Thus, history provides clear examples of how even an atheoretical psychiatric nosology such as the DSM is vulnerable to pathologizing behavior based on socially accepted norms- norms which only come to be revealed as reflecting large scale societal biases as they change over time though shifts in generational perspectives.

In terms of legality of substance use today, we are, perhaps, in the midst of another cultural shift; along with the government's acknowledgment of disparate racial sentencing in drug crimes, there is an increased recognition today among professionals of the dissociation between legal status of drugs with their relative dangerousness to individuals and society as well as the calls for a scientifically informed drug policy [88–92]. Cannabis and its derivations, for example, hold the distinction of being classified as both a Schedule I (no currently accepted medical use and lack of safety) and its active ingredient, THC, in pill-form, as Schedule II (accepted medical use and high potential for abuse) [45]. Disparities can also be seen in the legal status of alcohol use which, despite its non-illicit standing, has been recognized to provide a relatively greater level of harm to individuals and society compared to illicit drugs (i.e., heroin, crack cocaine) [90]. The removal of the legal problems criterion may be reflective of a larger cultural change of increased recognition of the somewhat arbitrary division between legal status and levels of harm of substances. The removal of the legal problems criterion underscores the larger philosophical issue of relying on a fluctuating socially-constructed criterion with arguable racial and socio-economic disparity in defining an ostensibly biological disorder in an atheoretical symptom- based diagnostic manual.

7.3. Removal of the Abuse/Dependence Paradigm

Another significant change to the latest iteration of the DSM identified above (Section 6.4) is the removal of the Abuse/Dependence paradigm for Substance Use Disorders, a paradigm that has been present since the adoption of the DSM-III (1980). Within this paradigm Substance Abuse has been considered a “milder” form of Substance Dependence and often construed as a prodrome. Thus, while the two categories were intended to be diagnostically distinct, they were often interpreted as being related- a conceptualization which was argued in the 1970s and resurrected, albeit in a different form, in the new millennium. In making the case for the changes to the DSM-5, empirical findings derived from modern statistical models of the dimensionality of these categories was used, which found that the criteria aligned themselves on a single dimension, a single underlying construct [83,84,93–95]. Thus, the issue of validity was again brought into the spotlight. Similar to the socially constructed legal criterion described in the previous section, research into the validity of the Abuse category revealed a disproportionate number of cases of Abuse being diagnosed by a criterion item (i.e., hazardous drinking) which was, itself, socially biased and mediated by political factors. One study, for example, reported that out of 1385 individuals diagnosed with current alcohol abuse, 83.6% met the criteria based solely on hazardous use, with the majority (69.3%) meeting criteria through drinking and driving alone [96]. The same study found a positive relationship between socio-economic status and DSM-IV Alcohol Abuse diagnosis, which may be explained by higher-income drinkers having greater access to vehicles which, in turn, may lead to higher rates of hazardous drinking and, subsequently, Alcohol Abuse [96–98]. Such findings recall the recommendations described earlier [52] warning of the socially constructed and therefore problematic nature of the Abuse diagnosis.

Such findings resulted in the shift to the continuum model espoused in the DSM-5, a trend which was evident in the *severity specifiers* of previous versions (in fact, the DSM-IV and IV-TR contain a disclaimer, titled “Issues in the Use of DSM-IV: Limitations of the Categorical Approach” [19]; [20] (pp. xxii, xxxi). Although the DSM-5 has been criticized by some for retooling the longstanding dichotomy, this change may be viewed, in a larger sense, as finally addressing the conceptual validity problems underlying this distinction. For example, if Abuse was best conceptualized not a standalone mental disorder but rather as one dimension of the larger construct of the dependence syndrome as described by Edwards and Gross (1976) [54], then the amalgamation of the two diagnostic entities in the DSM-5 has increased not only the empirical but the conceptual validity of this underlying construct.

While the categorical classification of substance users in the DSM was done from an etiologically agnostic standpoint, it is plausible that, because the format is consensus (vs. theoretically) driven, and because individuals are pre-disposed to cause and effect thinking [62], the DSM will always retain elements of theory (albeit indirectly) and these will likely change as culture and thinking shift over time. As once (in) famously pointed out, symptoms of mental illness are directly tied to the social and ethical culture in which they take place [99]. While the advancement of empirical inductive reasoning which prompted the shift to the current model is a step forward in the science of classification, it is not without its limitations; some disagreements exist about relying on mathematical models to disprove clinically entrenched concepts [55] while others have raised concerns about the validity of diagnostic thresholds (i.e., mild, moderate, severe) and the arbitrariness of diagnostic cut-offs among SUD and other diagnoses [100–102]. Looking forward, it remains to be seen what effect this continuum of severity conceptualization has on clinical work and reliability and validity of diagnoses.

7.4. Addition of Craving Criterion

Another significant change in the DSM-5 identified above (Section 6.5) is the addition of the *craving* criterion. While craving has been noted in previous versions as a *feature* of the disorder, DSM-5 marks the first use of the symptom as an *actual* criterion item. According to Hasin, Fenton, Beseler, Park and Wall [57], the inclusion of craving was supported on several fronts, including its theoretical centrality in accurately describing a clinical feature of SUD, its association with cued self-administration and relapse, its well-studied role in human and animal models of substance use, its inclusion in the ICD-10, as well as the potential for pharmacotherapeutic intervention for craving and its neural substrates. Indeed, craving is often associated with increased likelihood of relapse to alcohol use, and therefore it is thought that managing craving may improve treatment outcomes. As such, a number of pharmacologic interventions have been investigated in the last several decades which target craving reduction as a mechanism to reduce substance use including acamprosate, naltrexone, disulfiram, varenicline, lamotrigine and others [103]. To date, the results of clinical studies on reducing craving have been promising although somewhat inconsistent and await future developments (e.g., the elucidation of underlying neurobiological circuits). Current hypotheses on the neurobiology of craving (i.e., Incentive-Sensitization Theory) posit that long term substance use leads to neuroadaptations which increase the incentive salience around stimuli associated with that substance which may occur independently of the changes that mediate the subjective euphoric effects as well as withdrawal, thereby resulting in subjective experience of craving even in circumstances which highly disincentivize substance use (i.e., social, occupational, recreational impairment) [104]. As craving is then, perhaps, the only criterion which may persist following protracted abstinence, future questions may arise about how to treat and code for craving and what role craving plays in identifying remission.

7.5. Inclusion of “Behavioral Addictions”

Since the DSM-III-R, the field has defined addictive behaviors as relating to compulsive substance use despite adverse consequences with physiological changes often present. The inclusion of behavioral addictions as psychiatric disorders likely marks the next large paradigm shift in the field of addictions and, not surprisingly, has already garnered some debate. Although the future of behavioral addictions may lack certitude as of yet, what does seem clear, from a nosological standpoint, is the eventual expansion of the conceptualization of the broader category of addictions. This is evidenced by the chapter title “Substance-Related and Addictive Disorders” and the inclusion of a behavioral addiction in the form of Gambling Disorder and discussion of Internet Gaming Disorder as an area of future research. Gambling Disorder had previously been included in Impulse Disorders Not Elsewhere Classified since the DSM-III (originally “Pathological Gambling”). That routine ingestion of a psychopharmacologic substance is not needed in conceptualizing addictive pathology may point to the growing conceptualization of addiction as the sum of a host of neuroadaptations related to dysregulation of endogenous neurotransmitters (as well as behavioral, genetic, and psychosocial factors) of which exogenous chemicals play a historically important but potentially diminishing part as the field progresses. Indeed, the rationale presented in the DSM-5 (i.e., that Gambling Disorder has a shared underlying neurological reward systems and some “behavioral symptoms that appear comparable to those produced by the substance use disorders” [22] appears to clearly lay the groundwork for the inclusion of other behavioral addictions. In fact, the text reports that other “excessive behavioral patterns” (i.e., internet gaming, “sex addiction”, “exercise addiction”, “shopping addiction”) are not yet included with the rationale cited that there has not been enough peer reviewed evidence to support diagnostic criteria “needed to identify these behaviors as mental disorders” [22]. While concern has been expressed about over-pathologizing human behavior, decreasing individual responsibility, and allowing for a deluge of un- or under-supported diagnoses to saturate and hence weaken the credibility of the field [105–107], future research into the neurobiological substrates of impulse-related disorders and addictions may lay a more solid framework for the behavioral addictions. Epidemiological and cultural factors of behavioral addictions will likely be an area of future research, as well as identifying behavioral and pharmacological treatment targets, creating validated and reliable measures, and measuring treatment outcomes.

8. Conclusions

The history of psychoactive substance use is remarkably long, dating as far back, in some cases, as the recorded history of human civilization allows. Compared to the length and complexity of human interactions with psychoactive substances over millennia, the involvement of mental health in regulating the extremes associated with over-use of psychoactive substances is a relatively recent phenomenon. The official nosology of the American mental health system, the DSM, was itself a significant advancement to the field, which lacked a unified classification system. Through its early iterations, the DSM continued to mature and shed its psychoanalytic roots in the name of the development of a unified nosology. By moving to atheoretical, consensus-based diagnostic entities, the DSM-III made a much needed and significant advancements in diagnostic reliability and validity, which supported the scientific development of the field of mental health. The observation that, despite the DSM's agnostic approach, most providers today do not conceptualize from a strictly atheoretical standpoint suggests the possibility that the greatest advancement in psychiatric in the last century may have the unintended effect of allowing room for unscientific, idiosyncratic, or disparate etiological interpretations in a field already beleaguered by lack of consensus. Despite the atheoretical nature of the DSM clinicians retain their own conceptualizations of causal etiologies of SUDs and such lack of consensus may hinder the adoption of EBPs as the field progresses.

One of the most recent developments in the DSM-5 is the removal of the legal problems criterion, a change, which may be not only driven by empirical findings but may also represent a cultural shift away from criminalizing substance users. Philosophically, such changes may signify a coming-to-terms with the socially constructed and therefore variable nature of criminal behavior, which has long been regarded as one of the characteristic descriptors of an ostensibly biological disorder. Such a change speaks to the observation that, contrary to the popular assumption that the path of social sciences is entirely objective and linear, the iterations of the DSM reveal, in fact, a progression that is susceptible to political and social influences [11]. As Kawa and Giordano [108] state,

The evolution of the DSM illustrates that what is considered to be “medical” and “scientific” is often not an immutable standard, but rather, may be variable across time and culture, and in this way contingent upon changes in dominant schools of thought [108] (p. 7).

While mental health disorders have characteristically lacked clearly demarcated boundaries and have so far largely defied attempts to elucidate and categorize their exclusive etiologies, an increasing number of individuals have, over time, connected such concerns to the descriptive vs. etiological nature of psychiatric nosology and the limitations inherent in maintaining such a model [107,108].

Today, the mental health field continues to defy its atheoretical nosology by developing, for example, concrete guidelines and research funding priorities to promote cross-diagnostic advancements in the etiology of mental health disorders based on translational neuroscience. This endeavor, known as Research Domain Criteria Initiative (RDoC), is bold in its unambiguously transdiagnostic approach and was developed by the National Institute of Mental Health as a direct challenge to the diagnostically agnostic categorizational approach of the DSM [109]. While RDoC has, of yet, failed to gain significant traction in the area of SUD research, it has the potential to impact the identity of the field of mental health, including the future of diagnostic classification, research priorities, and practitioner training [110]. If more readily adopted in SUD research, RDoC may be useful in expanding existing pre-clinical, and human translational approaches and could, potentially, impact the development of a new generation of SUD pharmacotherapies [111]. While such innovations might lend much needed support to a causation-based nosological system, other advancements (e.g., in statistical modeling and classification, including latent class analysis, latent profile analysis, etc.) may provide meaningful ways of understanding and classifying groups of individuals with SUDs without the need to forgo the descriptive approach. As such advances continue to develop, questions of epidemiology and, indeed, epistemology will no doubt continue to challenge the increasingly inter-connected fields of psychology, psychiatry, and neurology. In the meantime, the continued examination and quantification of objective characterological traits (e.g., impulsivity, affect dysregulation) and their neurobiological underpinnings [112–114] as well as the expanding field of epigenetics [115] may continue to deconstruct the historical debate of monism vs. dualism (i.e., “the mind-body problem”) which has long beleaguered epidemiology (and therefore nosology) in mental health.

Despite, then, the growing promise and increasing allure of a truly causation-based nosology in SUD/mental health, the realization of such an undertaking may yet prove elusive for decades to come. For now, little choice remains but to continue to refine the current classification strategy in a stepwise fashion while continuously promoting a deeper understanding and appreciation of its origins and influences.

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- Timetable of Drug Addiction

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1.9: Pathways to Recovery

The overarching message of this chapter is that there is no single right way to recover from the disease of addiction. Research and experience have demonstrated that recovery has many paths, and treatment providers, family members, and recovering persons should be open to using the methods that work best for the individual struggling with addiction. In short, although we might assume there is a single best way to do things, often many roads arrive at the same destination. This idea is critical to how we approach healing from addiction.

Recovery from addiction can include formal treatment, medication, dietary changes, increased exercise, meditation, mutual help groups, faith-based engagement, work with a counselor or therapist, and more. As the U. S. Surgeon General's Report from 2016 acknowledges: *There are many paths to recovery. People will choose their pathway based on their cultural values, their socioeconomic status, their psychological and behavioral needs, and the nature of their substance use disorder.*



At the same time, we do not need to have limitless choices. Successful outcomes can be grouped into clusters that represent a relatively brief menu of effective options for recovery. In this chapter, we emphasize principles of addiction treatment, evidence-based approaches, medication-assisted treatment, mutual help groups including Alcoholics Anonymous, and holistic approaches that incorporate diet, exercise, and spiritual practices.

Evidence-Based Approaches to Drug Addiction Treatment

This section presents examples of treatment approaches and components that have an evidence base supporting their use. Each approach is designed to address certain aspects of drug addiction and its consequences for the individual, family, and society. Some of the approaches are intended to supplement or enhance existing treatment programs, and others are fairly comprehensive in and of themselves.

The following section is broken down into Pharmacotherapies, Behavioral Therapies, and Behavioral Therapies Primarily for Adolescents. They are further subdivided according to particular substance use disorders. This list is not exhaustive, and new treatments are continually under development.

Pharmacotherapies

Opioid Addiction Methadone

Methadone is a long-acting synthetic opioid agonist medication that can prevent withdrawal symptoms and reduce craving in opioid-addicted individuals. It can also block the effects of illicit opioids. It has a long history of use in treatment of opioid dependence in adults and is taken orally. Methadone maintenance treatment is available in all but three States through specially licensed opioid treatment programs or methadone maintenance programs.

Combined with behavioral treatment: Research has shown that methadone maintenance is more effective when it includes individual and/or group counseling, with even better outcomes when patients are provided with, or referred to, other needed medical/psychiatric, psychological, and social services (e.g., employment or family services).

Buprenorphine

Buprenorphine is a synthetic opioid medication that acts as a partial agonist at opioid receptors—it does not produce the euphoria and sedation caused by heroin or other opioids but is able to reduce or eliminate withdrawal symptoms associated with opioid dependence and carries a low risk of overdose.

Buprenorphine is currently available in two formulations that are taken sublingually: (1) a pure form of the drug and (2) a more commonly prescribed formulation called Suboxone, which combines buprenorphine with the drug naloxone, an antagonist (or blocker) at opioid receptors. Naloxone has no effect when Suboxone is taken as prescribed, but if an addicted individual attempts to inject Suboxone, the naloxone will produce severe withdrawal symptoms. Thus, this formulation lessens the likelihood that the drug will be abused or diverted to others.

Buprenorphine treatment for detoxification and/or maintenance can be provided in office-based settings by qualified physicians who have received a waiver from the Drug Enforcement Administration (DEA), allowing them to prescribe it. The availability of office-based treatment for opioid addiction is a cost-effective approach that increases the reach of treatment and the options available to patients.

Buprenorphine is also available as in an implant and injection. The U.S. Food and Drug Administration (FDA) approved a 6-month subdermal buprenorphine implant in May 2016 and [a once-monthly buprenorphine injection in November 2017](#).

Naltrexone

Naltrexone is a synthetic opioid antagonist—it blocks opioids from binding to their receptors and thereby prevents their euphoric and other effects. It has been used for many years to reverse opioid overdose and is also approved for treating opioid addiction. The theory behind this treatment is that the repeated absence of the desired effects and the perceived futility of abusing opioids will gradually diminish craving and addiction. Naltrexone itself has no subjective effects following detoxification (that is, a person does not perceive any particular drug effect), it has no potential for abuse, and it is not addictive.

Naltrexone as a treatment for opioid addiction is usually prescribed in outpatient medical settings, although the treatment should begin after medical detoxification in a residential setting in order to prevent withdrawal symptoms.

Naltrexone must be taken orally—either daily or three times a week—but noncompliance with treatment is a common problem. Many experienced clinicians have found naltrexone best suited for highly motivated, recently detoxified patients who desire total abstinence because of external circumstances—for instance, professionals or parolees. Recently, a long-acting injectable version of naltrexone, called Vivitrol, was approved to treat opioid addiction. Because it only needs to be delivered once a month, this version of the drug can facilitate compliance and offers an alternative for those who do not wish to be placed on agonist/partial agonist medications.

Comparing Buprenorphine and Naltrexone

A NIDA study comparing the effectiveness of a buprenorphine/naloxone combination and an extended release naltrexone formulation on treating opioid use disorder has found that both medications are similarly effective in treating opioid use disorder once treatment is initiated. Because naltrexone requires full detoxification, initiating treatment among active opioid users was more difficult with this medication. However, once detoxification was complete, the naltrexone formulation had a similar effectiveness as the buprenorphine/naloxone combination.

Tobacco Addiction Nicotine Replacement Therapy (NRT)

A variety of formulations of nicotine replacement therapies (NRTs) now exist, including the transdermal nicotine patch, nicotine spray, nicotine gum, and nicotine lozenges. Because nicotine is the main addictive ingredient in tobacco, the rationale for NRT is that stable low levels of nicotine will prevent withdrawal symptoms—which often drive continued tobacco use—and help keep people motivated to quit. Research shows that combining the patch with another replacement therapy is more effective than a single therapy alone.

Bupropion (Zyban®)

Bupropion was originally marketed as an antidepressant (Wellbutrin). It produces mild stimulant effects by blocking the reuptake of certain neurotransmitters, especially norepinephrine and dopamine. A serendipitous observation among depressed patients was

that the medication was also effective in suppressing tobacco craving, helping them quit smoking without also gaining weight. Although bupropion's exact mechanisms of action in facilitating smoking cessation are unclear, it has FDA approval as a smoking cessation treatment.

Varenicline (Chantix®)

Varenicline is the most recently FDA-approved medication for smoking cessation. It acts on a subset of nicotinic receptors in the brain thought to be involved in the rewarding effects of nicotine. Varenicline acts as a partial agonist/antagonist at these receptors—this means that it mildly stimulates the nicotine receptor but not sufficiently to trigger the release of dopamine, which is important for the rewarding effects of nicotine. As an antagonist, varenicline also blocks the ability of nicotine to activate dopamine, interfering with the reinforcing effects of smoking, thereby reducing cravings and supporting abstinence from smoking.

Combined With Behavioral Treatment

Each of the above pharmacotherapies is recommended for use in combination with behavioral interventions, including group and individual therapies, as well as telephone quitlines. Behavioral approaches complement most tobacco addiction treatment programs. They can amplify the effects of medications by teaching people how to manage stress, recognize and avoid high-risk situations for smoking relapse, and develop alternative coping strategies (e.g., cigarette refusal skills, assertiveness, and time management skills) that they can practice in treatment, social, and work settings. Combined treatment is urged because behavioral and pharmacological treatments are thought to operate by different yet complementary mechanisms that can have additive effects.

Alcohol Addiction

Naltrexone

Naltrexone blocks opioid receptors that are involved in the rewarding effects of drinking and the craving for alcohol. It has been shown to reduce relapse to problem drinking in some patients. An extended release version, Vivitrol—administered once a month by injection—is also FDA-approved for treating alcoholism, and may offer benefits regarding compliance.

Acamprosate

Acamprosate (Campral®) acts on the gamma-aminobutyric acid (GABA) and glutamate neurotransmitter systems and is thought to reduce symptoms of protracted withdrawal, such as insomnia, anxiety, restlessness, and dysphoria. Acamprosate has been shown to help dependent drinkers maintain abstinence for several weeks to months, and it may be more effective in patients with severe dependence.

Disulfiram

Disulfiram (Antabuse®) interferes with degradation of alcohol, resulting in the accumulation of acetaldehyde, which, in turn, produces a very unpleasant reaction that includes flushing, nausea, and palpitations if a person drinks alcohol. The utility and effectiveness of disulfiram are considered limited because compliance is generally poor. However, among patients who are highly motivated, disulfiram can be effective, and some patients use it episodically for high-risk situations, such as social occasions where alcohol is present. It can also be administered in a monitored fashion, such as in a clinic or by a spouse, improving its efficacy.

Topiramate

Topiramate is thought to work by increasing inhibitory (GABA) neurotransmission and reducing stimulatory (glutamate) neurotransmission, although its precise mechanism of action is not known. Although topiramate has not yet received FDA approval for treating alcohol addiction, it is sometimes used off-label for this purpose. Topiramate has been shown in studies to significantly improve multiple drinking outcomes, compared with a placebo.

Combined With Behavioral Treatment

While a number of behavioral treatments have been shown to be effective in the treatment of alcohol addiction, it does not appear that an additive effect exists between behavioral treatments and pharmacotherapy. Studies have shown that just getting help is one of the most important factors in treating alcohol addiction; the precise type of treatment received is not as important.

Behavioral Therapies

Behavioral approaches help engage people in drug abuse treatment, provide incentives for them to remain abstinent, modify their attitudes and behaviors related to drug abuse, and increase their life skills to handle stressful circumstances and environmental cues that may trigger intense craving for drugs and prompt another cycle of compulsive abuse. Below are a number of behavioral

therapies shown to be effective in addressing substance abuse (effectiveness with particular drugs of abuse is denoted in parentheses).

Cognitive-Behavioral Therapy (Alcohol, Marijuana, Cocaine, Methamphetamine, Nicotine)

Cognitive-Behavioral Therapy (CBT) was developed as a method to prevent relapse when treating problem drinking, and later it was adapted for cocaine-addicted individuals. Cognitive-behavioral strategies are based on the theory that in the development of maladaptive behavioral patterns like substance abuse, learning processes play a critical role. Individuals in CBT learn to identify and correct problematic behaviors by applying a range of different skills that can be used to stop drug abuse and to address a range of other problems that often co-occur with it.

A central element of CBT is anticipating likely problems and enhancing patients' self-control by helping them develop effective coping strategies. Specific techniques include exploring the positive and negative consequences of continued drug use, self-monitoring to recognize cravings early and identify situations that might put one at risk for use, and developing strategies for coping with cravings and avoiding those high-risk situations.

Research indicates that the skills individuals learn through cognitive-behavioral approaches remain after the completion of treatment. Current research focuses on how to produce even more powerful effects by combining CBT with medications for drug abuse and with other types of behavioral therapies. A computer-based CBT system has also been developed and has been shown to be effective in helping reduce drug use following standard drug abuse treatment.

Contingency Management Interventions/Motivational Incentives (Alcohol, Stimulants, Opioids, Marijuana, Nicotine)

Research has demonstrated the effectiveness of treatment approaches using contingency management (CM) principles, which involve giving patients tangible rewards to reinforce positive behaviors such as abstinence. Studies conducted in both methadone programs and psychosocial counseling treatment programs demonstrate that incentive-based interventions are highly effective in increasing treatment retention and promoting abstinence from drugs.

Voucher-Based Reinforcement (VBR) augments other community-based treatments for adults who primarily abuse opioids (especially heroin) or stimulants (especially cocaine) or both. In VBR, the patient receives a voucher for every drug-free urine sample provided. The voucher has monetary value that can be exchanged for food items, movie passes, or other goods or services that are consistent with a drug-free lifestyle. The voucher values are low at first, but increase as the number of consecutive drug-free urine samples increases; positive urine samples reset the value of the vouchers to the initial low value. VBR has been shown to be effective in promoting abstinence from opioids and cocaine in patients undergoing methadone detoxification.

Prize Incentives CM applies similar principles as VBR but uses chances to win cash prizes instead of vouchers. Over the course of the program (at least 3 months, one or more times weekly), participants supplying drug-negative urine or breath tests draw from a bowl for the chance to win a prize worth between \$1 and \$100. Participants may also receive draws for attending counseling sessions and completing weekly goal-related activities. The number of draws starts at one and increases with consecutive negative drug tests and/or counseling sessions attended but resets to one with any drug-positive sample or unexcused absence. The practitioner community has raised concerns that this intervention could promote gambling—as it contains an element of chance—and that pathological gambling and substance use disorders can be comorbid. However, studies examining this concern found that Prize Incentives CM did not promote gambling behavior.

Community Reinforcement Approach Plus Vouchers (Alcohol, Cocaine, Opioids)

Community Reinforcement Approach (CRA) Plus Vouchers is an intensive 24-week outpatient therapy for treating people addicted to cocaine and alcohol. It uses a range of recreational, familial, social, and vocational reinforcers, along with material incentives, to make a non-drug-using lifestyle more rewarding than substance use. The treatment goals are twofold:

To maintain abstinence long enough for patients to learn new life skills to help sustain it; and To reduce alcohol consumption for patients whose drinking is associated with cocaine use

Patients attend one or two individual counseling sessions each week, where they focus on improving family relations, learn a variety of skills to minimize drug use, receive vocational counseling, and develop new recreational activities and social networks. Those who also abuse alcohol receive clinic-monitored disulfiram (Antabuse) therapy. Patients submit urine samples two or three times each week and receive vouchers for cocaine-negative samples. As in VBR, the value of the vouchers increases with consecutive clean samples, and the vouchers may be exchanged for retail goods that are consistent with a drug-free lifestyle. Studies in both urban and rural areas have found that this approach facilitates patients' engagement in treatment and successfully aids them in gaining substantial periods of cocaine abstinence.

A computer-based version of CRA Plus Vouchers called the Therapeutic Education System (TES) was found to be nearly as effective as treatment administered by a therapist in promoting abstinence from opioids and cocaine among opioid-dependent individuals in outpatient treatment. A version of CRA for adolescents addresses problem-solving, coping, and communication skills and encourages active participation in positive social and recreational activities.

Motivational Enhancement Therapy (Alcohol, Marijuana, Nicotine)

Motivational Enhancement Therapy (MET) is a counseling approach that helps individuals resolve their ambivalence about engaging in treatment and stopping their drug use. This approach aims to evoke rapid and internally motivated change, rather than guide the patient stepwise through the recovery process. This therapy consists of an initial assessment battery session, followed by two to four individual treatment sessions with a therapist. In the first treatment session, the therapist provides feedback to the initial assessment, stimulating discussion about personal substance use and eliciting self-motivational statements. Motivational interviewing principles are used to strengthen motivation and build a plan for change. Coping strategies for high-risk situations are suggested and discussed with the patient. In subsequent sessions, the therapist monitors change, reviews cessation strategies being used, and continues to encourage commitment to change or sustained abstinence. Patients sometimes are encouraged to bring a significant other to sessions.

Research on MET suggests that its effects depend on the type of drug used by participants and on the goal of the intervention. This approach has been used successfully with people addicted to alcohol to both improve their engagement in treatment and reduce their problem drinking. MET has also been used successfully with marijuana-dependent adults when combined with cognitive-behavioral therapy, constituting a more comprehensive treatment approach. The results of MET are mixed for people abusing other drugs (e.g., heroin, cocaine, nicotine) and for adolescents who tend to use multiple drugs. In general, MET seems to be more effective for engaging drug abusers in treatment than for producing changes in drug use.

The Matrix Model (Stimulants)

The Matrix Model provides a framework for engaging stimulant (e.g., methamphetamine and cocaine) abusers in treatment and helping them achieve abstinence. Patients learn about issues critical to addiction and relapse, receive direction and support from a trained therapist, and become familiar with self-help programs. Patients are monitored for drug use through urine testing.

The therapist functions simultaneously as teacher and coach, fostering a positive, encouraging relationship with the patient and using that relationship to reinforce positive behavior change. The interaction between the therapist and the patient is authentic and direct but not confrontational or parental. Therapists are trained to conduct treatment sessions in a way that promotes the patient's self-esteem, dignity, and self-worth. A positive relationship between patient and therapist is critical to patient retention.

Treatment materials draw heavily on other tested treatment approaches and, thus, include elements of relapse prevention, family and group therapies, drug education, and self-help participation. Detailed treatment manuals contain worksheets for individual sessions; other components include family education groups, early recovery skills groups, relapse prevention groups, combined sessions, urine tests, 12-step programs, relapse analysis, and social support groups.

A number of studies have demonstrated that participants treated using the Matrix Model show statistically significant reductions in drug and alcohol use, improvements in psychological indicators, and reduced risky sexual behaviors associated with HIV transmission.

12-Step Facilitation Therapy (Alcohol, Stimulants, Opiates)

Twelve-step facilitation therapy is an active engagement strategy designed to increase the likelihood of a substance abuser becoming affiliated with and actively involved in 12-step self-help groups, thereby promoting abstinence. Three key ideas predominate: (1) acceptance, which includes the realization that drug addiction is a chronic, progressive disease over which one has no control, that life has become unmanageable because of drugs, that willpower alone is insufficient to overcome the problem, and that abstinence is the only alternative; (2) surrender, which involves giving oneself over to a higher power, accepting the fellowship and support structure of other recovering addicted individuals, and following the recovery activities laid out by the 12-step program; and (3) active involvement in 12-step meetings and related activities. While the efficacy of 12-step programs (and 12-step facilitation) in treating alcohol dependence has been established, the research on its usefulness for other forms of substance abuse is more preliminary, but the treatment appears promising for helping drug abusers sustain recovery.

Family Behavior Therapy

Family Behavior Therapy (FBT), which has demonstrated positive results in both adults and adolescents, is aimed at addressing not only substance use problems but other co-occurring problems as well, such as conduct disorders, child mistreatment, depression,

family conflict, and unemployment. FBT combines behavioral contracting with contingency management.

FBT involves the patient along with at least one significant other such as a cohabiting partner or a parent (in the case of adolescents). Therapists seek to engage families in applying the behavioral strategies taught in sessions and in acquiring new skills to improve the home environment. Patients are encouraged to develop behavioral goals for preventing substance use and HIV infection, which are anchored to a contingency management system. Substance-abusing parents are prompted to set goals related to effective parenting behaviors. During each session, the behavioral goals are reviewed, with rewards provided by significant others when goals are accomplished. Patients participate in treatment planning, choosing specific interventions from a menu of evidence-based treatment options. In a series of comparisons involving adolescents with and without conduct disorder, FBT was found to be more effective than supportive counseling.

Behavioral Therapies Primarily for Adolescents

Drug-abusing and addicted adolescents have unique treatment needs. Research has shown that treatments designed for and tested in adult populations often need to be modified to be effective in adolescents. Family involvement is a particularly important component for interventions targeting youth. Below are examples of behavioral interventions that employ these principles and have shown efficacy for treating addiction in youth.

Multisystemic Therapy

Multisystemic Therapy (MST) addresses the factors associated with serious antisocial behavior in children and adolescents who abuse alcohol and other drugs. These factors include characteristics of the child or adolescent (e.g., favorable attitudes toward drug use), the family (poor discipline, family conflict, parental drug abuse), peers (positive attitudes toward drug use), school (dropout, poor performance), and neighborhood (criminal subculture). By participating in intensive treatment in natural environments (homes, schools, and neighborhood settings), most youths and families complete a full course of treatment. MST significantly reduces adolescent drug use during treatment and for at least 6 months after treatment. Fewer incarcerations and out-of-home juvenile placements offset the cost of providing this intensive service and maintaining the clinicians' low caseloads.

Multidimensional Family Therapy

Multidimensional Family Therapy (MDFT) for adolescents is an outpatient, family-based treatment for teenagers who abuse alcohol or other drugs. MDFT views adolescent drug use in terms of a network of influences (individual, family, peer, community) and suggests that reducing unwanted behavior and increasing desirable behavior occur in multiple ways in different settings. Treatment includes individual and family sessions held in the clinic, in the home, or with family members at the family court, school, or other community locations.

During individual sessions, the therapist and adolescent work on important developmental tasks, such as developing decision-making, negotiation, and problem-solving skills. Teenagers acquire vocational skills and skills in communicating their thoughts and feelings to deal better with life stressors. Parallel sessions are held with family members. Parents examine their particular parenting styles, learning to distinguish influence from control and to have a positive and developmentally appropriate influence on their children.

Brief Strategic Family Therapy

Brief Strategic Family Therapy (BSFT) targets family interactions that are thought to maintain or exacerbate adolescent drug abuse and other co-occurring problem behaviors. Such problem behaviors include conduct problems at home and at school, oppositional behavior, delinquency, associating with antisocial peers, aggressive and violent behavior, and risky sexual behavior. BSFT is based on a family systems approach to treatment, in which family members' behaviors are assumed to be interdependent such that the symptoms of one member (the drug-abusing adolescent, for example) are indicative, at least in part, of what else is occurring in the family system. The role of the BSFT counselor is to identify the patterns of family interaction that are associated with the adolescent's behavior problems and to assist in changing those problem-maintaining family patterns. BSFT is meant to be a flexible approach that can be adapted to a broad range of family situations in various settings (mental health clinics, drug abuse treatment programs, other social service settings, and families' homes) and in various treatment modalities (as a primary outpatient intervention, in combination with residential or day treatment, and as an aftercare/continuing-care service following residential treatment).

Functional Family Therapy

Functional Family Therapy (FFT) is another treatment based on a family systems approach, in which an adolescent's behavior problems are seen as being created or maintained by a family's dysfunctional interaction patterns. FFT aims to reduce problem

behaviors by improving communication, problem-solving, conflict resolution, and parenting skills. The intervention always includes the adolescent and at least one family member in each session. Principal treatment tactics include (1) engaging families in the treatment process and enhancing their motivation for change and (2) bringing about changes in family members' behavior using contingency management techniques, communication and problem-solving, behavioral contracts, and other behavioral interventions.

Adolescent Community Reinforcement Approach and Assertive Continuing Care

The Adolescent Community Reinforcement Approach (A-CRA) is another comprehensive substance abuse treatment intervention that involves the adolescent and his or her family. It seeks to support the individual's recovery by increasing family, social, and educational/vocational reinforcers. After assessing the adolescent's needs and levels of functioning, the therapist chooses from among 17 A-CRA procedures to address problem-solving, coping, and communication skills and to encourage active participation in positive social and recreational activities. A-CRA skills training involves role-playing and behavioral rehearsal.

Assertive Continuing Care (ACC) is a home-based continuing-care approach to preventing relapse. Weekly home visits take place over a 12- to 14-week period after an adolescent is discharged from residential, intensive outpatient, or regular outpatient treatment. Using positive and negative reinforcement to shape behaviors, along with training in problem-solving and communication skills, ACC combines A-CRA and assertive case management services (e.g., use of a multidisciplinary team of professionals, round-the-clock coverage, assertive outreach) to help adolescents and their caregivers acquire the skills to engage in positive social activities.

Mutual Help Groups

12-Step Groups

To describe the impact and evolution of 12-step groups, let's begin here:

It's a warm spring afternoon in 1935, and Bill Wilson is out of town on a business trip. He paces impatiently in the lobby of his hotel in Akron, Ohio, hundreds of miles from his home in New York. He has concluded a series of unsuccessful meetings and feels frustrated and alone.

Wilson has struggled with his sobriety since returning as an officer in the Great War (World War I) in 1919. He has been in and out of hospitals and psychiatric wards, repeatedly finding his way back to alcohol. Following a spiritual awakening, he now has several months sober, but he realizes he desperately needs to talk to someone else.

And not just any someone, but in particular, someone who can understand what he is going through. He needs someone who can listen to him without judgment, who won't continuously interrupt to have him explain his experiences and feelings. Someone who will just KNOW what Wilson is going through as he feels the pangs of longing for just one sip of a drink.

There's a well-stocked bar a few steps away. From inside, Wilson hears the friendly chatter of hotel guests enjoying a carefree afternoon. He sees rows of attractive bottles lining the walls as the bartender pours a crisp, refreshing beer into a cold glass for one of the patrons. Wilson begins to sweat, and his brain can only think about the pure delight of that first sip of alcohol touching his lips. Yet he resists the urge momentarily and has another idea.

Wilson begins pouring nickel after nickel into the payphone in the hotel's lobby, looking to connect with a local who might guide him to another person who has experienced the struggle of sobriety. He eventually gets in touch with a pastor who gives him the name of Henrietta Seiberling, a local Oxford Group leader. Seiberling invites Wilson to meet with a nearby physician and known alcoholic, Dr. Bob Smith.

Wilson drives to Dr. Smith's residence and approaches him tentatively. Wilson begins describing his desire to speak with someone about his drinking. At first, Smith mistakenly assumes Wilson has come to convince him of the need to seek help for Smith's drinking problem, but the opposite is true. Wilson wants to be able to share openly about his own experiences and feelings, with Smith serving as audience and de facto therapist.

By the end of the afternoon, neither has taken a drink. A fast friendship develops, along with a growing desire to reach out to others by sharing their stories. Their collaboration leads to the emergence of the first meetings of a group called Alcoholics Anonymous (AA). The group eventually spreads to every state and nearly every country in the world, and it has spawned over 200 other groups that utilize the same 12 steps of AA, touching millions of lives along the way.^[1]

AA was not the first group to try and support people who wanted to quit drinking, but it was the most successful, and its staying power is a testament to the model. Before AA, organizations that tried to help people stay sober were primarily religious in nature.

Just before AA's founding, Bill Wilson attended the Oxford Group, which emphasized evangelical Christian principles along with meetings where members confessed their struggles with alcoholism while seeking guidance from senior group members.

The roots of AA are clear to see in the tenets of the Oxford Group. In an essay he wrote in 1960, Bill Wilson acknowledged that most of the steps of AA “stem directly” from the Oxford Group’s principles. However, Wilson and Smith realized that a strict emphasis on religion would ultimately turn people away and fracture the group, so they developed an approach that mirrors many traditional Judeo-Christian teachings but invites people of all backgrounds to participate. The rapid spread of AA meetings, followed by the publication of the group’s official text (often referred to as ‘The Big Book’) in 1939, laid the groundwork for what would become modern addiction treatment in America. Bill Wilson was actively involved in helping several treatment centers establish their programs, notably the flagship location of Hazelden in Center City, Minnesota.

In addition to 12-step groups, several other groups have emerged to support various types of recovery. These include Rational Recovery/SMART Recovery, Celebrate Recovery, Women for Sobriety, and Refuge Recovery. Interestingly, some of these groups vehemently eschew the role of spirituality in recovery (e.g. Rational Recovery), while others use it as their primary focus (e.g., Celebrate Recovery).

A brief list of examples of 12-step organizations:

Alcoholics Anonymous – founded in 1935, the original 12-step group focuses on helping its members to quit drinking and to spread their message to others

Al-Anon Family Groups – founded in 1951 as a group to support family members and loved ones of alcoholics

Narcotics Anonymous – founded in 1953 to help people quit using drugs other than alcohol

Gamblers Anonymous – founded in 1957 to help compulsive gamblers

Overeaters Anonymous – founded in 1960 to help people who have lost control over their eating

Emotions Anonymous – founded in 1971 for people who are working on emotional stability

In addition to the groups listed above, dozens of other problems have been targeted by 12-step fellowships. Each group applies the same steps to a particular issue that people are struggling with. This is consistent with the 12 traditions of AA, which include a narrow focus on helping others who have a problem with alcohol (tradition five) and avoidance of views on all outside issues (tradition ten).



Recovery Support Groups Not Based on the 12 Steps

While millions of people credit 12-step involvement for their sobriety, many have been unsuccessful in Alcoholics Anonymous or have sought other alternatives. Some of these groups are discussed below.

Women for Sobriety

Often cited as the first secular alternative to Alcoholics Anonymous, [Women for Sobriety](#) was established in the 1970s by sociologist Jean Kirkpatrick as a group seeking to create a program more friendly to women. The group developed their own steps called the New Life program that alter the language of AA's 12 steps, notably removing the word "powerless" from the first step.

Rational Recovery

As an alternative to traditional Alcoholics Anonymous groups, Rational Recovery was founded in 1986 by Jack Trimpey based on self-help rather than mutual help. The model of Rational Recovery does away with all mentions of spirituality and does not hold meetings. Instead, Rational Recovery emphasizes identifying and labeling one's addictive voice that perpetuates the using behavior. According to the program, once a person learns the foundational cognitive skills of the approach, he or she simply needs to apply them on a regular basis, thus the removal of spirituality and fellowship from the program.

SMART Recovery

[SMART](#) stands for self-management and recovery training. This group emerged in the 1990s as some members of Rational Recovery found they wanted to hold in-person meetings to discuss their recovery. They utilize cognitive-behavioral techniques to help members practice improved coping skills and resist urges to use. Their in-person and online meetings are run by a certified SMART trainer.

Celebrate Recovery

Founded in 1991, [Celebrate Recovery](#) is a dedicated Christian organization. Whereas the 12 steps make general reference to a higher power but do not promote any particular religious beliefs, Celebrate Recovery promotes a path to healing that incorporates teachings from the Bible. As their website explains, they are a "Christ-centered 12-step program." There are other significant differences from 12-step groups that distinguish Celebrate Recovery. First, the group does not focus on a single issue; they allow people with all addictions to participate. Members struggle with a range of problems the group describes as "hurts, hang-ups, and habits." Second, there is an emphasis on naming your higher power as Jesus and an unapologetic push to make Christ the focal point of recovery.

Refuge Recovery

Like Celebrate Recovery, [Refuge Recovery](#) uses spiritual practices as a foundation for recovery. In this group, Buddhist beliefs and practices are used in a non-theistic way to support sobriety. The group's principles are based in part on those of Alcoholics Anonymous. Practices include meditation and mindfulness training, along with the "Four Truths of Refuge Recovery":

- Addiction creates suffering
- The cause of addiction is repetitive craving
- Recovery is possible
- The path to recovery is available

Substance Abuse and Mental Health Services Administration (US); Office of the Surgeon General (US). Facing Addiction in America: The Surgeon General's Report on Alcohol, Drugs, and Health [Internet]. Washington (DC): US Department of Health and Human Services; 2016 Nov. CHAPTER 5, RECOVERY: THE MANY PATHS TO WELLNESS. Available from: www.ncbi.nlm.nih.gov/books/NBK424846/

Holistic Approaches

In keeping with the concept of offering a menu of options to people in recovery, we close this chapter with a look at additional practices that may be beneficial. This includes such tools as dietary changes, exercise, and spiritual involvement.

Substance Use Recovery and Diet Courtesy of MedlinePlus from the National Library of Medicine

Substance use harms the body in two ways:

- The substance itself affects the body.
- It causes negative lifestyle changes, such as irregular eating and poor diet.

Proper nutrition can help the healing process. Nutrients supply the body with energy. They provide substances to build and maintain healthy organs and fight off infection.

Recovery from [substance use](#) also affects the body in different ways, including metabolism (processing energy), organ function, and mental well-being.

The impact of different drugs on nutrition is described below.

OPIATES

Opiates (including codeine, oxycodone, heroin, and morphine) affect the gastrointestinal system. Constipation is a very common symptom of substance use. Symptoms that are common during withdrawal include:

- Diarrhea
- Nausea and vomiting

These symptoms may lead to a lack of enough nutrients and an imbalance of electrolytes (such as sodium, potassium, and chloride).

Eating balanced meals may make these symptoms less severe (however, eating can be difficult, due to nausea). A [high-fiber](#) diet with plenty of complex carbohydrates (such as whole grains, vegetables, peas, and beans) is recommended.

ALCOHOL

[Alcohol use](#) is one of the major causes of nutritional deficiency in the United States. The most common deficiencies are of the B vitamins ([B1](#), [B6](#), and [folic acid](#)). A lack of these nutrients causes [anemia](#) and nervous system (neurologic) problems. For example, a disease called [Wernicke-Korsakoff syndrome](#) (“wet brain”) occurs when heavy alcohol use causes a lack of vitamin B1.

Alcohol use also damages two major organs involved in metabolism and nutrition: the liver and the pancreas. The liver removes toxins from harmful substances. The pancreas regulates blood sugar and the absorption of fat. Damage to these two organs results in an imbalance of fluids, calories, protein, and [electrolytes](#).

Other complications include:

- [Diabetes](#)
- High blood pressure
- Permanent liver damage (or [cirrhosis](#))
- [Seizures](#)
- Severe malnutrition
- Shortened life expectancy

A woman’s poor diet when pregnant, especially if she drinks alcohol, can harm the baby’s growth and development in the womb. Infants who were exposed to alcohol while in the womb often have physical and mental problems. The alcohol affects the growing baby by crossing the placenta. After birth, the baby may have withdrawal symptoms.

Laboratory tests for [protein](#), iron, and electrolytes may be needed to determine if there is liver disease in addition to the alcohol problem. Women who drink heavily are at high risk of [osteoporosis](#) and may need to take calcium supplements.

STIMULANTS

Stimulant use (such as crack, [cocaine](#), and [methamphetamine](#)) reduces appetite, and leads to weight loss and poor nutrition. Users of these drugs may stay up for days at a time. They may be dehydrated and have electrolyte imbalances during these episodes. Returning to a normal diet can be hard if a person has lost a lot of weight.

Memory problems, which may be permanent, are a complication of long-term stimulant use.

MARIJUANA

Marijuana can increase appetite. Some long-term users may be overweight and need to cut back on fat, sugar, and total calories.

NUTRITION AND PSYCHOLOGICAL ASPECTS OF SUBSTANCE USE

When a person feels better, they are less likely to start using alcohol and drugs again. Because balanced nutrition helps improve mood and health, it is important to encourage a healthy diet in a person recovering from alcohol and other drug problems.

But someone who has just given up an important source of pleasure may not be ready to make other drastic lifestyle changes. So, it is more important that the person avoid returning to substance use than sticking with a strict diet.

GUIDELINES

- Stick to regular mealtimes.
- Eat foods that are low in fat.
- Get more protein, [complex carbohydrates](#), and dietary fiber.
- Vitamin and mineral supplements may be helpful during recovery (this may include B-complex, zinc, and vitamins A and C).

A person with substance use is more likely to relapse when they have poor eating habits. This is why regular meals are important. Drug and alcohol addiction causes a person to forget what it is like to be hungry, and instead think of this feeling as a drug craving. The person should be encouraged to think that they may be hungry when cravings become strong.

During recovery from substance use, [dehydration](#) is common. It is important to get enough fluids during and in between meals. Appetite usually returns during recovery. A person in recovery is often more likely to overeat, particularly if they were taking stimulants. It is important to eat healthy meals and snacks and avoid high-calorie foods with low nutrition, such as sweets.

The following tips can help improve the odds of a lasting and healthy recovery:

- Eat nutritious meals and snacks.
- Get physical activity and enough rest.
- Reduce caffeine and stop smoking, if possible.
- Seek help from counselors or support groups on a regular basis.
- Take vitamin and mineral supplements if recommended by the health care provider.

Roessler, K.K. Exercise treatment for drug abuse—a Danish pilot study. *Scand J Public Health*. 2010 Aug;38(6):664-9. doi: 10.1177/1403494810371249. Epub 2010 Jun 7. PMID: 20529968.

Chapter Quiz

A link to an interactive elements can be found at the bottom of this page.

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1. This story is based on the book *My Name is Bill* by Susan Cheever. ↵

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1.10: Epilogue- Future Directions

Relatively speaking, the field of addiction studies is a new one. Before the mid-1900s, addiction treatment and addiction professionals did not exist. The lack of research and the stigma around addiction meant that those struggling with addiction had few options at the time.

Over the past several decades, our understanding of this illness has increased significantly, and we expect that it will grow tremendously in the coming years. We may well look back in just a couple of decades at how limited our knowledge is today, and that would be a wonderful thing!

We wanted to close this book by discussing a few of the significant issues we see facing the field of addictions in the coming years. These topics are food for thought for anyone currently in the field or considering a career that deals with addictions.

1. One of the trends we have noticed in recent years is an increased emphasis on the use of medications to treat addiction. The gold standard of opioid treatment is now rooted in medication-assisted therapy such as Suboxone or methadone. We believe that this trend will continue as further research uncovers medications that help support recovery from drugs such as cocaine and marijuana, which currently have no such options.
2. Other developments may arise through new ways to treat chronic pain. The opioid epidemics of the early 21st century have created concern among elected officials and the general public about the overuse of prescription pain medicines. Scientists are now attempting to find ways of managing pain that do not have the same risk of abuse and addiction that come with traditional opioid medications. Such a breakthrough could be a major public health milestone, as opioid overdose has become one of the leading causes of death in the United States.
3. In terms of treatment approaches, we also see creative methods being used to offer improved services, such as case management and coaching models. Managed care remains a struggle for treatment providers, with an emphasis on evidenced-based, well-documented treatment. Agencies have also begun emphasizing case management approaches that connect clients with a myriad of community resources to support the recovery process.
4. Recovery coaching is a new model that utilizes a paraprofessional who can guide someone in recovery. Such an individual would have some training but would not serve in the role of a clinical staff member. In many ways, this harkens back to the roots of the field, when most counselors were themselves in recovery and often newly-minted graduates of the very treatment program where they worked. Addictions treatment has become more medically-based and now requires higher levels of education, which are positive developments. At the same time, the importance of peer support cannot be underestimated. After all, it is one of the foundations of 12-step recovery, which has a longer history of success than any other approach. A recovery coach might fill this need while supporting the work of treatment professionals.
5. One last issue we wanted to raise here is that the cultural norms around drug use are shifting. As mentioned in the presentation on “the celebrated drugs,” the role of marijuana in American culture has changed as medicinal and even recreational use become the norm. Meanwhile, traditional tobacco products such as cigarettes are on the decline, even though e-cigarettes may be quickly taking their place. As we learn more about the dangers of alcohol, will its prominent place in society remain unchanged, or will it experience the same fate as cigarettes? These issues may have different answers from one year to the next, and even from one part of the country to the next.

We hope you have enjoyed this book and expanded your knowledge about the field of addiction studies. At the same time, we realize the contents here only scratch the surface when it comes to the ocean of information about addiction. Whether you are considering a career in addictions or another mental health profession, or you are the friend or loved one of someone suffering from addiction, or you find yourself wondering about your own drug use, please keep learning and searching for answers.

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