A Resource Guide on the Epidemiology, Prevention, and Treatment of Opioid and Other Substance Use.

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A Resource Guide on the Epidemiology, Prevention, and Treatment of Opioid and Other Substance Use.

By

Anthony Francis Rotoloni

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A Resource Guide on the Epidemiology, Prevention, and Treatment of Opioid and Other Substance Use.

by

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Author’s Statement Page

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Anthony Francis Rotoloni
What is A Substance Use Disorder?

The *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) recently changed how substance use disorders are defined and diagnosed. A substance use disorder is measured based on four behavioral categories, impaired control, risky use, social impairment, pharmacological indicators (tolerance and withdrawal) and is measured from mild to severe impairment (Kahan & Watt, 2017). The difference between a substance use disorder and substance abuse problem is dependent on the length of substance use. Long-term substance abuse problems are referred to as substance use disorders and should be treated as serious mental illnesses (SAMHSA, 2017). It is observed that persons with substance use disorders can live relatively normal lives and function adequately enough to survive day to day. Addiction and dependence are components of a substance use disorder. Addiction is when pursuit or, use of the substance begin to define the user’s life. Addictive behaviors are the symptom of psychological disorders in combination with chemical dependence.

Introduction

Substance use is a complex public health issue that needs to be addressed through multiple frameworks, and viewpoints. The cost of substance use on American productivity is estimated by the National Institute on Drug Abuse (NIDA) to be $740 billion annually (NIDA, 2017). The nationwide opioid epidemic has brought unprecedented attention to the public health issue of substance abuse. The spotlight is currently on opioids, but it is important to keep other prominent illicit substances in mind. The etiology of substance use is a complex issue that researchers are still trying to elucidate. Two variables that have been found to have a high association with the development of a substance use disorder are childhood trauma, and stress. These events are categorized as, adverse childhood events (ACEs). ACEs are strong predictors of the lifetime risk of substance use and engagement in risky behaviors (Dube et al., 2003). Substance use is also a known risk factor for engagement in risky sexual behaviors. This resource guide will discuss the lifetime epidemiological risk of substance use. This includes how substance use impacts a person’s risk of engagement in risky sexual behavior.
Alcohol abuse is a pressing public health burden. The Centers for Disease Control and Prevention estimate that alcohol kills over 80,000 people per year and cost the United States $249 billion in lost productivity in 2010 (CDC, 2018). Despite these statistics alcohol remains a staple of American culture. Public health officials need to fight not only the addictive power of alcohol, but also the power of alcohol advertising and cultural normalization. Social expectancies are an extremely important tool in understanding how alcohol impacts the health of a user.

Research by George and Stoner (2000) describe how social expectancies shape the intentions of users. They found that sexual behavior is greatly influenced by alcohol consumption among men and women. Men and women perceive each other as more sexually attractive and sexually open when consuming alcohol. Men also reported associating alcohol with sexual behaviors, which increase their engagement in risky sexual behaviors. Based on large epidemiological surveys, such as the National Epidemiologic Survey on Alcohol and Related Conditions, men aged 18-25 have the highest risk of alcohol use disorder (AUD) (Delker, Brown, & Hasin, 2016).

The risk among men differs between racial groups as well; white males having the highest prevalence of alcohol consumption, especially older white men. Despite the high prevalence of alcohol consumption among white males, the highest prevalence of AUD is among Native Americans (Delker et al., 2016; Sarche & Spicer, 2008). The rates of AUD among Native Americans are high in part due to their cultural history of alcohol and tobacco use. Tobacco being used as currency was common practice among Native American tribes before European colonization. European colonization brought trade in the form of alcohol for tobacco. As European colonization increased, trade and the rate of alcohol consumption increased along with it. As a result of this, Native Americans have a very high prevalence of alcoholism.

The pharmacology of alcohol makes recovery from AUD very difficult. The neurotransmitters of a person with AUD no longer function normally (Figure 1). Alcohol indirectly binds with the gamma-aminobutyric acid (GABA) receptors where its action mimics GABA (Figure 2). The GABA receptors are found throughout the central nervous system and are major inhibitory neurotransmitters (Olsen & Delorey, 1999). Alcohol inhibits glutamate, interferes with glucose regulation, and causes the neurotransmitters dopamine and serotonin to be released (Banerjee, 2014). Dopamine and serotonin are responsible for feelings of pleasure, reward seeking, motivation, and several other crucial functions. Chronic alcohol consumption can create a physical dependence in the brain that alters brain chemistry (Clapp, Bhave, & Hoffman, 2008). (Figure 3). In addition, inhibition of the GABA receptors results in reduced anxiety, which prompts the user to seek alcohol when experiencing stress or trauma (Clapp et al., 2008). Once the brain has created new pathways, cessation of use becomes incredibly difficult.

When someone with AUD or a physical dependence on alcohol stops consuming it, they experience withdrawal (Banerjee, 2014). Withdrawal is the result of an absence of vital neurotransmitters, dopamine, serotonin, and GABA (Clapp et al., 2008). The user’s brain has stopped producing these transmitters on its own because alcohol used to provide them (Figure 4). When someone is going through alcohol withdraw, they can experience withdrawal symptoms such as, anxiety, depression, mood swings, fever, sweating, irritability, nausea, insomnia and delirium (Medlineplus, 2019). These symptoms can be life threatening and are the reason that relapse is so common among AUD patients. Due to the high prevalence of AUD there are many resources available to help users get into recovery.

Throughout American history there have been social movements to ban the use of alcohol because of its destructive nature. Federal action against alcohol use was taken by the passage of prohibition, which was started by the ratification of the 18th amendment of the United States Constitution. The 18th amendment made the sale and production of intoxicating liquors illegal (History,
The prohibition movement, as it would later be called, was largely led by women, due to the destruction alcohol abuse often brings to families (History, 2009). At first prohibition was moderately successful in reducing alcohol related arrests and crime (History, 2009). Enforcement proved to be difficult though and depended largely on how sympathetic communities were to the new laws (History, 2009). Illegal alcohol manufacturing, known as bootlegging, and speakeasys (clubs where alcohol was illegally sold) began to create an impressive black market for alcohol (History, 2009). Prohibition also disproportionally impacted the poor and working class because illegal alcohol was expensive, compared to the more well off who could easily pay the increased prices. Prohibition came to an end in 1933 under President Roosevelt. He used the legalization of alcohol to spur job creation during the great depression and took advantage of the vast cultural desire for legalization. Despite the failure of prohibition, the main issue as to why many in the temperance movement wanted to outlaw it was ahead of its time.

Current research on ACEs brought on by alcoholic parents provide robust scientific support for the impact that alcoholism has on children, and families (Dube et al., 2003). There are several government resources, such as the Substance Abuse and Mental Health Services Administration (SAMHSA) national helpline that is available on their website. Government services such as Medicare and Medicaid will cover treatment for AUD among qualified rehab centers. The Affordable Care Act also opened many opportunities for treatment for users who opt into it. Additional federal and state recovery and prevention organizations and program can be found in the substance use resources listed at the end of this resource guide.

![Figure 1. An illustration of how healthy neurons function.](image-url)
Figure 2. How the brain’s glutamate system reacts to alcohol consumption.


Figure 3. Areas of the brain that are effected by alcohol use.

Figure 4. How the brain’s glutamate system functions during alcohol withdrawal.

Opiates

The United States has experienced three waves of mass opiate addiction since the 19th century (Dark Paradise, 2001). The death toll from overdose caused by any opiate has reached almost 400,000 since 1997, and of the 70,200 overdose deaths in 2017 68% involved an opiate (Scholl, Seth, Kariisa, Wilson, & Baldwin, 2018; Opioid, 2018). Currently synthetic opioids, like fentanyl and illegally manufactured fentanyl analogs are the driving force of overdose deaths (Opioid, 2018). The incidence of human immunodeficiency virus (HIV) and other sexually transmitted diseases (STDs) in the United States has been rising alongside the opioid epidemic and is an urgent public health problem. Recreational drug use has been linked to an increased risk of engaging in risky sexual behaviors and acquiring HIV or other STD’s (Mitchell & Potenza, 2014). Research has found that drug users are more likely to engage in risky behavior, such as impulsivity and sensation seeking (Celentano, Latimore, & Mehta, 2008).

All opioids interact with the endogenous opiate system. Researchers have found that there are three types of opioid receptors, mu, kappa, and delta. The mu opioid receptors are the primary target of opiates that are commonly abused (Figure 5). When the opioid binds to the mu receptors, the brain produces the same biochemical reward response as experienced by normal everyday life functions, such as eating or sex (Kosten & George, 2002). Figure 6 illustrates the areas of the brain impacted by opiate use. Opioids are highly active in the mesolimbic reward system. The mesolimbic system sends dopamine to the nucleus accumbens which causes feelings of pleasure. This chain reaction caused by opiate use creates powerful reward pathways in the brain that can reactivate and cause opiate craving when stimulated (Kosten & George, 2002). These new pathways in the brain persist long after opiate use has stopped, and they can be triggered by intense stress or environmental stimuli. The intense feelings of pleasure and wellbeing triggered in the nucleus accumbens (NAc) by dopamine from the ventral tegmental area (VTA) creates a reward pathway in the prefrontal cortex (PFC) that drives addictive behavior (Figure 6) (Kosten & George, 2002).

The phenomena of tolerance is when users must take increasing doses of the substance in order to achieve the same pharmacological effect (Shenoy & Lui, 2018). Figure 7 illustrates how tolerance for opiates builds. Tolerance is dangerous because the negative side effects of the opiates, such as respiratory sedation begin to become stronger (Shenoy & Lui, 2018). A user who develops tolerance becomes susceptible to developing both physical and psychological dependence (Shenoy & Lui, 2018). Physical dependence on opiates will occur from any prolonged use of the drug, even in clinical settings. The time it takes to develop physical dependence varies from person to person (Shenoy & Lui, 2018). Physical dependence is not the same as opiate addiction. Addictive behaviors, such as drug seeking, doctor shopping, or taking more of the drug than needed begin to develop when psychological dependence begins. Withdrawal is the major driver of opiate abuse disorder. The physical pain and discomfort caused by opiate withdrawal enhances the psychological drive to use the drug, this is known as opiate craving (figure 7). Opiate cravings felt during withdrawal are powerful influences on behavior and actions the user engages in. Opiate withdrawal has proven to be a difficult condition due to the complexity presented by truncated variants in the G-coupled opioid receptors, and heterogeneity in receptor interactions (Burma, Kwok, & Trang, 2017). When a user begins to experience opiate withdrawal, the nervous system enters a state of hyperexcitability. The hyperexcitability of the nervous system during opiate withdrawal causes immense anxiety, gastrointestinal distress, restlessness, insomnia, and hyperhidrosis (Burma et al., 2017). Noradrenaline which was once suppressed by the opiate use enters a state of enhanced
noradrenergic tone, causing withdrawal symptoms (Burma et al., 2017). The drive to alleviate symptoms of withdrawal often lead users to seek street opiates, which further amplifies the addictive cycle (Burma et al., 2017). There is another type of opiate withdrawal that is lesser known but, is beginning to gain the attention of the medical community. Post-acute withdrawal syndrome (PAWS) is a phenomenon that occurs after the acute phase withdrawal from a substance (Crane, 2018). PAWS is most commonly seen in amphetamine, alcohol, benzodiazepine, and opiate abusers who had used the drugs for prolonged periods (Crane, 2018). The symptoms of PAWS are not as intense as the symptoms during acute withdrawal, but they can last much longer (Crane, 2018). One of the major symptoms of PAWS is anhedonia, which is the inability to feel pleasure from typical life stimuli. Along with anhedonia PAWS sufferers also experience insomnia, depression, brain fog, and difficulty concentrating (Crane, 2018). PAWS is likely a major driver of relapse due to the prolonged period the symptoms occur. Users can begin to experience hopelessness because even though they have weathered acute withdrawal and stopped their drug abuse, they still feel the effects months after they had ceased use (Crane, 2018). When subjected to the symptoms of PAWS for a prolonged period, drug use begins to seem like the only way to feel anything again. PAWS will typically subside if the user stays sober and practices healthy life habits. The amount of time a user will experience PAWS and the likelihood that they will experience it depends on what substance was used and for how long (Crane, 2018). Opiate withdrawal also is the main driver in amplifying the risk user’s incur during opiate use.

The effect of opiates on the brain creates intense euphoria but is also sedating. Compared to amphetamines both substances cause large amounts of dopamine to be released but amphetamines increase the risk of engagement in risky sexual behaviors while the users are “high” on the substance. Amphetamines increase energy and lower inhibitions, while opiates sedate and relax the user. Opiates also suppress testosterone in both men and women leading to a general reduction in libido both while using opiates and when in withdrawal (Le-Merrer, Becker, Befort, & Kieffer, 2009). User’s increase their risk of contracting HIV/STDs when they engage in trading sexual acts for opiates or engage in sex work for money to support their addiction to opiates. Opiates and amphetamines are often used together during circuit parties, which are gatherings where men who have sex with men (MSM) engage in social activities and often group drug use/sexual activities. In this population it is common to trade sexual favors for drugs and to use drugs to enhance sexual experiences (chemsex). These behaviors expose MSM to an increased risk of acquiring HIV/STDs, especially when Intravenous (IV) drug use is common (Colfax et al., 2001). Researchers have seen that users who injected prescription opioids are more likely to report being HIV-positive and have had previous STD diagnoses (Jaeger-Woods, Jaeger, Donenberg, & Wilson, 2013). Women are also at an increased risk of being taken advantage of sexually during opiate withdrawal. Women who use opioids were subjected to increased rates of sexual violence when compared to women who did not use opioids (Mateu-Gelabert, Guarino, Jessell, & Teper, 2015).

Opioid abuse disorder is particularly difficult to recover from due to the impact that opiates have on the user’s brain. Long-term opiate use changes the neuropathways in the user’s brain so that even when they have stopped using, they will experience cravings for the substance. Complete recovery is possible from long-term opiate use, but recovery can take years. Due to the rise in opiate overdose deaths many new treatment tools and modalities are being made available for any user who is willing to ask for help. One of the most effective ways to fight opiate addiction is with medication assisted treatment. Medication assisted treatment include substituting illicit opioid use with prescription opiate use, coupled with behavioral coaching and psychotherapy. Opiate users can slowly taper down their prescribed opiates while they learn the deep psychological drivers of their addictive behavior. Traumatic childhood experiences, or ACEs are strong predictors of lifetime drug abuse and opiate users who have experienced these events need to learn how to cope and heal
from them in beneficial ways (Dube et al., 2003). Medication assisted therapy is useful because it enables the opiate user to have a stable emotional state while processing these traumatic experiences, reducing the likelihood of relapse. Detox programs and 12-step programs are also available to help opiate users stop their drug use and learn why they began to use the drugs in an unhealthy manner. Several government organizations like the United States department of Health and Human Services, National Institute on Drug Abuse, and the National Institute of Health have federally funded programs to help people who are suffering from opiate use disorder.

![Figure 5](https://www.the-scientist.com/cover-story/pain-and-progress-38043)

**Figure 5.** Morphine activates the opioid receptors, reduces the release of γ-amniobutyric acid (GABA) and causes excess dopamine to be released.

**Source:** [https://www.the-scientist.com/cover-story/pain-and-progress-38043](https://www.the-scientist.com/cover-story/pain-and-progress-38043)
Figure 6. Opioids stimulate the ventral tegmental area (VTA) releasing dopamine into the nucleus accumbens (NAc) which causes intense feelings of pleasure and satisfaction. A feedback loop of this reward mechanism then forms between the prefrontal cortex (PFC) and VTA pushing the user to pursue this feeling over anything else.

Source: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2851054/
Figure 7. The mechanism of opioid tolerance and withdrawal.

Source: https://medium.com/dr-ming-kao/opioid-tolerance-dependence-and-withdrawal-821ef0ec7dd7
Amphetamines

The incidence of amphetamine drug use has increased throughout the United States over the last decade (Piper et al., 2018). Amphetamine overdose deaths are the second most common type of drug overdose death, behind opiates (NIH). One reason that there has been an increase in amphetamine usage over the past decade is because of the class of drugs used for the front-line treatment of ADHD. Adderall, Ritalin, Vyvanse, Concerta, Dexedrine, and Focalin are common brand names for amphetamine-based prescription ADHD treatment. Methamphetamine is a class of amphetamine that is nearly exclusively used for recreational purposes and is the drug of choice for many amphetamine addicts. Illicit methamphetamine use is not nearly as prevalent as illicit opioid use and has a strong regional component. The 2018 National Drug Early Warning System (NDEWS) reported that admission to treatment centers for methamphetamine use west of the Mississippi river (12-29%) was significantly higher than admissions east of the Mississippi (<1%), except for the Atlanta metro area which reported 11% of treatment admissions for methamphetamine use (Artigiani, Hsu, McMandlish, & Wish, 2018). Amphetamine use is a particularly salient statistic to note during the opiate epidemic because it is frequently the drug of choice for opiate users who are also polysubstance users. Users will combine opiates and methamphetamine and inject them (often referred to as speedball or goofball). The result is one of the most powerful and deadly forms of illicit drug combinations; many high-profile celebrity deaths have been from this combination.

Amphetamine drugs are highly addictive due to their pharmacology (figure 8,9). Amphetamines primarily act on dopamine receptors, where they increase extracellular dopamine by prolonging dopamine receptor signaling in the striatum (Calipari & Ferris, 2013). Dopamine is a vital neurotransmitter for proper executive functioning, emotional salience, motivation, and reward reinforcement (Calipari & Ferris, 2013). Amphetamines are useful for ADHD treatment because current research suggests that a lack of dopamine negatively influences a person’s ability to stay focused, motivated, and maintain good executive function. The increase in dopamine is useful for alleviating these symptoms, but the impact that these drugs have on reward salience, and motivation can lead to dependence and addiction (figure 9). Even when amphetamine drugs are taken as prescribed, they can change the brain’s ability to produce dopamine naturally. When this change occurs, a person will experience withdrawal effects if they stop taking their medication. Withdrawal can then lead to drug seeking behavior and can push a person to use methamphetamine. Methamphetamine and prescription amphetamines have the same effect on the brain, but methamphetamine is much stronger in the effects than prescription. The effects of methamphetamine are extremely potent that addiction can occur after the first use, especially if it is administered intravenously (IV).

Methamphetamine use is a risk factor for engagement in risky sexual behavior. The incidence of methamphetamine use is high in certain populations. Men who have sex with men (MSM), chemsex users (enhancement of sex through substances), polysubstance users, and opiate users all have a higher incidence of methamphetamine use than the general public (SAMHSA, 2018). Injection drug users who shoot methamphetamine are at an increased risk for contracting HIV, or hepatitis B or C (NIH, 2019). MSM who participate in methamphetamine injection drug use (IDU) are more likely to engage in risky
sexual behaviors, facilitated by methamphetamine use. When methamphetamine is used intravenously it causes intense euphoria and decreased inhibition, which lowers the rate of condom use among MSM (Bull, Pper, & Rietmeijer, 2002). The NIH has found that methamphetamine users are more likely than any other group of substance abusers to contract HIV due to two factors; needle sharing, and the effect that methamphetamine has on libido and reward processing (NIH, 2019). Methamphetamine users who already had HIV were found to have worse outcomes than non-users and users who were taking highly active antiretroviral therapy (HAART) were more likely to develop AIDS (Ellis et al., 2003; Fairbairn et al., 2011).

Figure 8. Illustration of a neurotransmitter under the influence of cocaine. Cocaine blocks dopamine re-uptake resulting in excess levels of dopamine in the synapse.

Source: [http://universe-review.ca/R10-16-ANS01.htm](http://universe-review.ca/R10-16-ANS01.htm)
Figure 9. This illustration shows how the neurotransmitters react to amphetamines causing a surge of dopamine and noradrenaline in the synaptic cleft.

Source: https://forensictoxicology-blog.tumblr.com/post/43936999014/mechanism-of-action
Cannabis

Cannabis or marijuana is the most commonly used illicit substance in the United States. A 2015 report from the National Survey on Drug use and Health reported that nearly 22.2 million people had used marijuana in the last month (SAMSHA, 2018). The monitoring the future survey (MTF) reported that 43.6% of 12th graders had reported trying marijuana at least once in their lifetime. The National Survey on Drug use and Health showed that 22.1% of people aged 18 through 25 had used marijuana in the past month (NIH, 2019). Marijuana’s complex legal status makes it unique when compared to the other substances in this resource guide. Marijuana has been federally illegal in the United States since the Controlled Substances Act was passed in 1970 by Richard Nixon. Since then the legality of marijuana use has repeatedly been a subject of controversy. One of the main reasons for this legal battle is over the legitimacy of marijuana use as a medicine. The changing legal status of marijuana has made understanding the impact that it has on the brain a pressing research issue. This is especially important due to adolescent usage and the impact on engagement in risky behaviors that marijuana use may contribute to.

The active components in marijuana are known as cannabinoids and they interact with the bodies endocannabinoid system. The most well-known cannabinoid is delta-9-tetrahydrocannabinol or THC. This is a psychoactive cannabinoid that is responsible for the ‘high’ feeling that users report after consumption of marijuana. The cannabinoid system regulates many important functions like mood, appetite, and pain-suppression (figure 10). Marijuana’s ability to inhibit pain is a major driver in the effort to allow chronic pain patients access to medical marijuana as an alternative to opiate medication. There are two types of cannabinoid receptors cannabinoid receptor 1 (CB1) and cannabinoid receptor 2 (CB2) (Zou & Kumar, 2018). Receptors CB1 and CB2 are members of the G-protein family. The G-protein coupled family of neuroreceptors are abundant through many vital systems in the body and brain (figure 13). These findings have led scientists to believe that humans evolved the ability to experience cannabinoids. There are two main types of cannabinoids: Phyto-cannabinoids (cannabinoids that come from the plant) THC is an example of this, and endogenous cannabinoids which are formed in the body. Examples of endogenous cannabinoids are N-arachidonoylethanolamine or anandamide (AE) or 2-arachidonoylglycerol (2-AG), purified, and synthetic (NIH, 2018). There is emerging research that suggests cannabinoids can have an impact on fertility, but research is mixed. Gorzalka and Dang (2012) found that cannabis use heightened male and female sexual proceptivity. They found that as the amount of cannabis increased, males began to experience a drop in sexual proceptivity while females remained similar with a slight rise (Gorzalka, Hill, & Chang, 2010). Gorzalka and Dang (2012) theorized that THC reduces testosterone and luteinizing hormone by binding to the cannabinoid receptors CB1 and CB2. Mimicking anandamide an endogenous cannabinoid (figure 11). This effect is more present in men due to increased levels of testosterone (Gorzalka et al., 2010; Gorzalka & Dang, 2012). It is difficult for researchers to further study cannabis due to the changing legal status of the substance.

The impact that cannabis has on risky sexual behavior is mediated by its legal status. Federally cannabis is still listed as a schedule 1 substance and is illegal in the United States. States have voted and decided to legalize both medicinal and recreational cannabis use. The distinction between medicinal and recreational use differs between states. The distinction between legal and illegal is important to note because the legality of a substance can impact the population that uses it. Research has found that the impact cannabis has on sexual risk behavior is mediated by the social expectancies the user experiences (Stoner, 2018). Hendershot et al., (2010) investigated this phenomenon and found that among
adolescents’ strong sexual expectancies that were associated with cannabis use predicted an increase in the user’s engagement in risky sexual behavior. The impact that cannabis use has depends also on how regularly it is used, if it is used alone or with other substances, and the type of association being researched. (Stoner, 2018). Brodbeck, Matter, and Moggi (2006) found that cannabis users aged 16-24 who reported at least weekly cannabis use were more likely to engage in risky sexual behavior than their peers who did not use cannabis. Polysubstance use that included cannabis also was found to impact a person’s likelihood of engaging in risky sexual behavior within the past 12 months (Swartzendruber, Sales, Brown, DiClemente, Rose, 2016). Event-Level studies of the impact on cannabis use showed that, among adolescents, cannabis use was associated with an increase in risky sexual behaviors, but among adults no association was found (Stoner, 2018). Research by Walsh, Fielder, Carey and Carey (2014) supports this finding. They found that among the college aged women in their study cannabis use was not associated with an increase in risky sexual behavior. The mixed results of these studies show that much more research on cannabis’ impact on risky sexual behavior is needed. Currently, researchers believe that the impact cannabis has on a person’s risk of engagement in risky sexual behavior is dependent on the social expectancies in which cannabis is being used (Stoner, 2018).

**Figure 10.** Brain structures in which the endocannabinoid system is active.

**Source:** http://headsup.scholastic.com/students/the-science-of-marijuana
Figure 11. The similarity of the brain’s natural chemical anandamide and THC from cannabis.

Source: https://www.drugabuse.gov/publications/research-reports/marijuana/how-does-marijuana-produce-its-effects

Figure 13. Illustration of how THC impacts the body’s ability to produce neurotransmitters.

Trend Graphics of Substance Use in the United States

Graphic 1: Results from the 2017 NSDUH on illicit drug use.

Graphic 2: Reports of alcohol use disorder given from the 2017 NSDUH


Graphic 3: Break down of prescription pain reliever misuse among age categories.

Graphic 4: Percentage of each type of opiate misused the previous year among respondents to the NSDUH.


Graphic 5: Marijuana use in the past year broken down by age group.
Graphic 6: Prevalence of cannabis use among young adults.


Graphic 7: Prevalence of methamphetamine use among age groups.

# Substance Abuse Resources

<table>
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<th>Substance</th>
<th>Resources</th>
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| Alcohol     | **CADCA** - Anti-Drug Coalitions of America  
**NIAAA** - National Institute on Alcohol Abuse and Alcoholism  
**AA** - Alcoholics Anonymous  
**ICCPUD** - Interagency Coordination Commity on the Prevention of Underage Drinking  
**NASADAD** - National Association of State Alcohol and Drug Abuse Directors  
**NTN** - National Treatment Network  
**NCADD** - National Council on Alcohol and Drug Dependence  
**NPN** - National Prevention Network  
**NYRF** - National Youth Recovery Foundation  
**YPR** - Young People in Recovery |
| Opiates     | **NIH (HEAL)** - National Institute of Health Helping to End Addiction Long-Term  
**HHS** - Health and Human Services Opioids page  
**NA** - Narcotics Anonymous  
**SMART Recovery** - 4 point program to help people overcome addictive behaviors  
**NAR-ANON** - Support for friends and family of narcotic addicts  
**NIDA** - National Institute on Drug Abuse Prevention Tools |
| Cannabis    | **NIH** - National Institute of Health  
**SAMHSA** - Substance Abuse and Mental Health Services Administration  
**MA** - Marijuana Anonymous |
| Amphetamines| **Crystal Meth ANON** - Community support for crystal meth addicts  
**ACA** - American Addiction Centers  
**SAMHSA** - Substance Abuse and Mental Health Services Administration |
References


