**DRUG AND ALCOHOL ADDICTION AND ITS COMPLEX COMPONENTS**

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**DRUG AND ALCOHOL ADDICTION AND ITS COMPLEX COMPONENTS**

Cheyla Clark, MPH

University of Pittsburgh, 2014**ABSTRACT**

Addiction is a chronic and progressive disease. It is incurable and has many cycles of relapse and recovery. Addiction disrupts the complex interactions of reward, memory, and motivation within the brain. Some of the consequences of addiction are the loss of years of life due to death or disability. The disease of addiction places a great burden on public health systems. Domestic violence and child abuse may also increase in families or relationships in which one or more individuals are struggling with substance abuse and/or addiction. Substance abuse may also lead to the development of many chronic diseases and mental illnesses, as well as increased risk of contracting incurable viruses such as Hepatitis C and HIV/AIDS. These consequences increase the financial burden on families and the healthcare system. Similar to the impact in the U.S., substance abuse world-wide also results in productivity loss and life-years, and an increased burden on healthcare. There are many risk factors for the development of addiction. These include gender, ethnicity, age, mental health disorders, environmental factors, stress, and abuse. Specifically, women progress through the stages of addiction more rapidly than men, most likely due to biological and social components that increase their susceptibility for the development of addiction. Furthermore, many individuals presenting with a drug addiction are also diagnosed with mental illnesses. These diagnoses may co-occur because of (1) the substance abuse induced mental illness or (2) prior mental illness prompted the substance abuse. Therefore, integrated treatment that addresses both substance abuse and mental health conditions may have better recovery outcomes for the individual. As an example, Sojourner House (a Pittsburgh based residential program for women in recovery) uses a combination of treatment levels to provide help to mothers and their children suffering through addiction. In addition to environmental risk factors, genetic factors may also increase an individual’s susceptibility to developing a drug or alcohol addiction. Personalized medicine could be added to these treatment plans to provide even more specialized care for individuals with substance abuse issues.

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# Definition of Addiction

Addiction is a disease that is both chronic and progressive. Because it is chronic, i.e. incurable, the disease progression often involves many cycles of relapse and recovery. Without proper treatment and activities to perpetuate recovery, addiction can result in death. The American Society of Addiction Medicine defines addiction as the inability to abstain from using drugs and/or alcohol, impaired control, impaired behavior, and a decreased awareness of behavioral problems or relationship issues3. Individuals who are addicted have a dysfunctional emotional response to situations, such as paranoia and distrust towards others, and difficulties in interpersonal relationships.

## Public Health impact in the u.s.

Drug and alcohol addiction affects millions of Americans aged 12 and older as well as their loved ones. Statistics from self-reported abuse, hospitals, and treatment organizations show that approximately 8.3% (17.6 million) of U.S. adults are dependent on alcohol, 8% of the adult population uses illegal drugs, and 20% of the US population abuse prescription drugs2. These numbers manifest in huge public health consequences, that is, families are damaged, employment is lost, public safety is threatened, and the healthcare and court system are stressed.

According to the Center for Disease Control, approximately 88,000 deaths annually are alcohol related2 and alcoholism is the 3rd leading lifestyle-related cause of death for the U.S.2. Excessive use of alcohol has been estimated to result in a mean of 30 years of potential life lost for each death caused by alcohol2. Alcohol addiction leads to many health problems such as chronic diseases, neurological impairments, and mental illness2. Drug use propagates the spread of HIV/AIDs and Hepatitis C due to the use of needles and other drug paraphilia. With the exclusion of maternity and intensive care unit beds, 40% of U.S. hospital beds are used to treat alcohol related health conditions2.

Alcohol and drug abuse have a large impact on violence, crime and the criminal justice system. Alcohol is a factor in 40% of violent crimes2 comprising rape, sexual assault, robbery, and aggravated and simple assault. Alcohol is also a factor in 32% of vehicular fatalities2. Between 1996 and 2006, incarcerations increased by 43% due in part to drug related crimes29. Furthermore in 2006, 37% of local, state, and federal incarcerations consisted of inmates whose primary offense was violent with 77.5% of those crimes involving substance abuse29. In 2010, drug related offenses totaled 51.4% of the total inmate population in local, state, and federal facilities29. Drug and alcohol abuse also increases the occurrence of domestic violence and child abuse. The U.S. Department of Justice reports that 61% of domestic violence offenders had substance abuse problems13. The National Committee to Prevent Child Abuse found by means of a survey that 80% of child abuse is associated with substance abuse13.

Addiction does not discriminate; it plagues individuals from all economic groups, sexes, and races. Substance abuse is estimated to cost the US $137 billion in health care and $600 billion in productivity, health, and crime related costs annually8 (Table 1).

Table . Costs of Substance abuse in the United States

|  |  |  |
| --- | --- | --- |
|  | **Health Care** | **Overall** |
| Tobacco | $96 billion | $193 billion |
| Alcohol | $30 billion | $235 billion |
| Illicit Drugs | $11 billion | $193 billion |

## Impact of substance abuse worldwide

Substance abuse (drugs and/or alcohol) is a public health problem worldwide. The World Drug Report in 2012 stated that an estimated 230 million adults have used illicit drugs16, that is, approximately 5% of the youth and adult population. Of those 230 million, 27 million use illicit drugs heavily enough to qualify as an addiction15. The global prevalence of alcohol use is approximately 42% of the youth and adult population, and is much higher than illicit drug use (Figure 1). However, the prevalence of alcohol use varies by world region (Table 2). The annual prevalence of alcohol use is higher than the global annual average prevalence of alcohol use in Europe, the Americas and the Western Pacific. In regions where alcohol is prohibited or inappropriate due to religion reasons15, such as the Eastern Mediterranean region, the prevalence is below the global annual average.

The prevalence of illicit drug use is high, but an even greater concern is that the prevalence of illicit drug use has risen amongst youth. For example, in the U.S. in 2009, 36.8% of high school students reported using marijuana30. Generally, the prevalence of drug use increases in the teenage years and peaks between ages 18 to 25 years old15. Individuals usually seek treatment for drug use when they are in the late 20s or early 30s15 and most drug-related deaths usually occur within the mid 30s15. Furthermore, trends across the world show a greater amount of substance abuse in men when compared to women. In the U.S. 18.2% of males compared to 12.5% of females aged 12 and above report substance abuse15. In most of Europe (France, Germany, the United Kingdom, and Northern Ireland) female use of alcohol or illicit drugs is half or less than half that of male use (4.4% to 9.1% respectively) 15. These reports are consistent with findings that a greater number of men than women are substance abusers, however, as stated in the coming sections, there are many factors that predict these statistics.

As expected, the high prevalence of substance abuse across different world regions has a huge impact on productivity loss, health care costs, and life-years lost. A World Health Organization (WHO) study in 2003 determined that there are 200,000 substance related deaths per year15. These deaths were estimated to account for 11.2 million life-years lost (these years are disability adjusted life years) due to drugs15. On average, 19 years are lost per 100 drug users and 2 years are lost per 100 users of alcohol15. Substance abuse across the world accounts for the use of 1.7 beds per 100,000 in hospitals for the treatment of alcohol and drug health conditions16. Only 30% of countries have effective medication or pharmacological treatment available for health conditions related to alcohol and drug effects16. Treatments could include those such as methadone clinics, suboxone, and naloxone.

Substance abuse also presents significant health risks because the chemical substances can induce stroke, deadly arrhythmias, hyperthermia, impair driving ability, and cause the development or worsening of behavioral and psychological conditions15. Drug use also perpetuates the spread of HIV/AIDS and hepatitis B and C especially amongst intravenous drug users. As of 2010, there are 16 million IV drug users and of those users, 1 in 5 are positive for HIV and hepatitis B15. About half (8 million) of the IV drug users are positive for hepatitis C15. These numbers will result in a significant financial burden on the world because of the costs of caring for the potentially fatal outcomes of these diseases. Another financial burden is that of rehabilitation treatment costs for those substance abusers seeking treatment. An estimated 4.5 million people worldwide seek treatment15. In the U.S. in 2010, the health-related costs of treatment were $24 billion15.

Each region of the world has a drug market specific to them (Table 2); however, North America has the biggest market for illicit drugs. The United Nations Office on Drugs and Control (UNODC) estimated that in 2009 the retail market for cocaine was worth $85 million and the opiate market was worth $68 million15. In the 2003, the overall value of the illicit drug market was $320 billion accounting for 0.9% of global Gross Domestic Produce (GDP)15.

Table . Illicit Drug Markets Worldwide and Prevalence of Alcohol Use

|  |  |  |
| --- | --- | --- |
| **Region** | **Illicit Drug Market** | **Prevalence of Alcohol Use** |
| Africa | Cannabis | 29% |
| Asia | Opiates and Synthetic Drugs |  |
| Southeast Asia |  | 11% |
| Eastern Mediterranean |  | 3.5% |
| Europe | Cocaine | 69% |
| South America | Cocaine and Cannabis | 58% |
| North America | Synthetic Drugs and Cannabis | 58% |

Modified from UNODC World Drug Report 201215

**Adapted from UNODC report15**

Figure . Global Estimates of Prevalence of Use of Illicit and Pyschoactive Substances Amongst Youth and Adult Populations

# Risk factors For the development of addiction

Similar to other chronic diseases, many risk factors have been associated with an individual’s increased susceptibility to development of a drug and/or alcohol addiction. Endogenous factors such as gender, ethnicity, age, and the presence of other mental health disorders may influence an individual’s risk. These endogenous factors interact with environmental risk factors such as socioeconomic status, overall quality of life, peer pressure, stress, and physical and/or sexual abuse. Many studies have shown that age at first use of a substance is associated with increased risk of developing an addiction20. In general, adolescents are more inclined toward risky behaviors than older individuals, and will continue with these behaviors21. This adolescent characteristic is consistent with the observation that development of a drug and/or alcohol addiction is greater amongst those individuals who engaged in substance abuse at an early age (before age 20) 18. Furthermore, children who display early aggressive and antisocial behavior that persists into early adolescence can predict the development of a substance abuse problem19.

## Co-occuring substance abuse and mental health

Dual diagnosis is defined by the National Alliance on Mental Illness (NAMI) as individuals with mental illness who have coexisting problems with drugs and/or alcohol7. The Substance Abuse and Mental health Services Administration (SAMHSA) reports that approximately 8.9 million individuals have a dual diagnosis14. Only 7.4% of these individuals receive treatment for both conditions and 55.8% receive no treatment for either7. There are certain populations that are more vulnerable to the development of co-occurring mental health and substance abuse including males, individuals of low socioeconomic status, military veterans, and individuals with other medical illnesses such as a chronic disease or condition7. These populations are particularly vulnerable because of the stress and trauma they often experience as a result of their circumstances and experiences. These experiences can range from post-traumatic stress disorder to bouts of homelessness or feelings of hopelessness due to monetary struggles.

Research has shown that nearly one-third of individuals with a mental health disorder and one-half of all individuals with severe mental health disorder, such as schizophrenia and bipolar disorder, also have drug and/or alcohol dependence. One-third of alcohol abusers and more than half of all drug abusers have a diagnosed mental illness7. Addiction and mental illness can co-occur because drugs and alcohol may be a form of self-medication for the individual7. Individuals with untreated or incompletely treated disorders may use drugs or alcohol as a coping mechanism and this self-medication worsens the condition7. Drugs and alcohol can also contribute to the onset of a mental illness that was not previously expressed7. Individuals with co-occurring substance abuse and mental illness are less likely to achieve lasting sobriety and require a different type of treatment as well as a different approach to treatment than individuals with just addiction7.

Treatment of individuals with a dual diagnosis is also much more difficult than the treatment of either one separately. Some of the difficulty lies in the reduced attention span, low levels of motivation, and a perceived fear of socializing with others14. The consequences of undiagnosed untreated, or undertreated dual diagnoses include an increased likelihood of homelessness, incarceration, sickness, suicide, and early mortality14. Integrated treatment or a treatment that simultaneously addresses the mental health condition and the substance abuse issue of an individual is associated with better outcomes and decreased relapse rates14. Better outcomes include reduced substance abuse, decreased hospitalizations, increased housing stability, improved psychiatric symptoms and functioning, fewer arrests, and overall improved quality of life14. However, according to HealthyPeople.gov, although individuals with dual diagnoses represent a large number of individuals with addictions, only “2.7% of persons with co-occurring substance abuse and mental disorders received treatment for both disorders in 2008”6. To improve upon this statistic, the mission of the residential treatment facility, Sojourner House, is to treat these “hard-to treat” individuals, and that is why a dual diagnosis is a requirement for the entrance into the Sojourner House program. Improving or implementing integrated treatment into existing or new substance abuse rehabilitation programs should have a positive impact on public health outcomes in this population due to the decrease of healthcare costs, substance abuse related crime, and loss of years of life due to early mortality.

## Women in addiction

Gender can affect an individual’s susceptibility, rate of recovery, and risk of relapse. The effects of substance abuse have been primarily studied in men because they have higher rates of substance use, abuse, and dependence12. The National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) was done to investigate the prevalence of substance use and psychiatric disorders. Results from this survey revealed that men were 2.2 times more likely than women to abuse substances and 1.9 times more likely to become dependent on substances12. In contrast, NESARC reported that women had higher rates of abuse for prescription drugs (narcotics analgesics and tranquilizers). Some other studies, however, report rates of prescription drug abuse that is equal between men and women12.

Telescoping is defined as an accelerated progression from initiation of substance use to the onset of addiction/dependence. Multiple studies report telescoping occurs up to twice as frequently among women who use cannabis, opioids, and alcohol than men12. When women enter treatment for substance abuse, their clinical symptoms are often more severe than that of men. They exhibit more medical, behavioral and psychological manifestations and social problems12. This difference occurs despite the fact that women use smaller amounts of substances and for a shorter amount of time when compared to men12.

There are a number of differences between men and women that may be the cause of the more severe clinical presentations in women. Biologically, women have higher levels of estrogen and progesterone, two steroid hormones that may influence effects of drugs on behavior. Human studies show that a greater response to stimulants is also associated with the follicular phase of the menstrual cycle12. In this phase, estradiol levels are high while progesterone is low. A dose-response study of cocaine administration showed women in the luteal phase claimed they had a lower feeling of being high than either men or women in the follicular phase of their menstrual cycle12. Sex differences also exist in the neuroendocrine adaptations to stress and reward systems in the brain12. These differences may account for the greater susceptibility of women to drug abuse and relapse although the exact mechanism is not well studied. These differences could be because women metabolize alcohol and other drugs such as opioids much slower than men so the effects on the dopamine system in the brains of women are greater. Co-occurrence of mental health disorders is also a factor in gender differences of addiction. Women have a greater lifetime risk for anxiety and depressive disorders than men as reported by Goldstein’s NESARC study. Furthermore, 29.7% of women with anxiety and depressive disorders also have substance abuse history12.

Finally, women who are substance abusers are less likely to seek treatment than are men, especially among women who have children to care for and women of low socioeconomic status. Women are most likely to have care of their children and can therefore be at risk for loss of their children if their substance abuse is seen as a threat to the children’s livelihood by the justice system. The social stigma attached to treatment facilities in general, as well as treatment facilities geared more towards men are barriers for women as well.

# Mechanisms of disease of addiction

The neurobiology of addiction involves an interaction of reward, memory, and motivation within the brain3. The reward circuitry of the brain is the mesolimbic dopamine system (Figure 2). This system is made of the prefrontal cortex, nucleus acumbens, and the ventral tagmental areas of the brain9. The mesolimbic pathways connect brain stem’s automatic bodily functions, the peripheral nervous system, and the emotional (limbic) areas of the brain to the prefrontal cortex of the brain9. The prefrontal cortex controls the decision-making and reflective processes of an individual’s central nervous system. Neurotransmitters (for example dopamine and beta endorphins) direct the communication of these systems in the reward circuitry9. These pathways are also involved in the behaviors of eating, sleeping, and sex. When an individual uses a substance such as alcohol or drugs, the substance essentially robs the neurotransmitters of their duty. An addict’s initial motivation to feel pleasure by using the substance eventually causes the reward pathway to shift from using neurotransmitters to having an increased sensitivity to the substance9. This is the start of the addictive cycle. The neurotransmitters and the receptors within the reward circuitry become diminished, creating a greater desire and need for more of the substance9. With increased use comes increased tolerance and the need for greater amounts of drugs or alcohol.

# The genetics of alcohol and drug addiction

An individual’s biology, environment, and development can explain why some individuals become addicted and others do not. Genetic factors account for approximately 50 percent of the likelihood that an individual will develop an addiction5. Predisposing genetic factors can make an individual more susceptible to both addiction and mental health disorders or increase the risk of the individual developing a second disorder after the first one occurs5. Environmental factors also interact with an individual’s biological factors and affect the degree to which genetic factors exert their influence. Environmental factors include socioeconomic status, overall quality of life, peer pressure, stress, and physical and/or sexual abuse5. The strength an individual gains through the quality of parenting they received and/or life experiences can affect the extent to which these genetic factors or predispositions lead to the behavioral symptoms of addiction5. Genetic and environmental factors interact during the critical developmental stages in an individual’s life, which also affects an individual’s susceptibility to addiction5. Gene expression and gene function can be altered by exposure to drugs, alcohol, and other factors such as stress and these alterations may lead to the development of addiction5.

Similar to many chronic diseases, such as diabetes or cardiovascular disease, the genetic component of addiction susceptibility is complex. Allelic variations in many different genes contribute to an individual’s overall resistance or susceptibility. To identify genes or biological pathways that influence disease susceptibility, researchers have used many methods such as genome-wide association (GWA) studies. GWA are used to assess whether variations in DNA sequences, such as single- nucleotide polymorphisms (SNPs) are associated with disease or risk factors for disease. When genotypes at specific SNP(s) are present significantly more frequently in individuals with disease than among those without disease, the SNP is inferred to be located near a gene that impacts susceptibility to the disease being studied. GWA studies have been used to determine whether there is evidence that specific genes are associated with tobacco, drug, and alcohol addiction. For example, the National Institute on Drug Abuse (NIDA) supported a GWA study to identify possible genetic variants associated with tobacco addiction. Saccone et al (2007) reported that variation at the nicotinic receptor was associated with nicotine addiction5. In this study the strongest association was with a SNP located near the *CHRNB3* locus (beta 3 nicotinic receptor subunit), 28 but is unlikely to be causal. Another significant SNP is a non-synonymous SNP in the alpha5 nicotinic receptor subunit gene, *CHRNA*528. This non-synonymous SNP causes an amino acid change in amino acid 398. This changes an asparagine, encoded by the G allele, to aspartic acid, encoded by the A allele. The risk allele in nicotine dependence is the A allele. This SNP demonstrated evidence of recessive inheritance, meaning that individuals who are homozygous for the A allele (AA), have a 2-fold increased risk of developing nicotine dependence after their first exposure to cigarette smoking28. Attesting to variable risk factors across ethnic groups, the study also showed that the frequency of A alleles in individuals of European descent was 42% as compared to a frequency of less than 5% in individuals of Asian and African descent28.

As stated above, susceptibility to diseases is due to environmental factors, genetic factors, and their interactions. A recent study by Caspi et al (2005), reports possible interactions between genetic variants, drug exposure, and age of use on risk of developing a mental disorder. Catechol- O- Methyltransferase (COMT) is a major enzyme involved in metabolic degradation of catecholamines (a family of neurotransmitters) 22. COMT catalyzes the transfer of a methyl group from S-adenosyl- methionine (SAM) to a hydroxyl group on a catechol nucleus22. These nuclei consist of the neurotransmitters dopamine, norepinephrine, and catechol estrogen22. COMT has been associated with an increased susceptibility to schizophrenia because of its role in dopamine metabolism. Additionally, a feature of Velocardial Facial Syndrome (VCFS) is psychotic illness. This disorder is due to a chromosomal deletion in the region where COMT is located. This results in a low or no expression of COMT and could be why this disorder is associated with high rates of schizophrenia22. A functional polymorphism that substitutes a valine (val) with a methionine (met) at codon 158 results in a 2 to 4 fold decrease in COMT activity27. In general, because Met is a low enzymatic activity allele, this results in an increased susceptibility to a wide range of psychiatric symptoms due to reduced metabolism of dopamine27. However, individuals with one or two copies of the Val variant have a higher risk of developing symptoms of psychosis and schizophrenic-type disorders if they used cannabis during adolescence5. Thus, there is a genotype by environment (cannibus use) interaction on risk of developing schizophrenia. (Figure 2)

**Adapted from Caspi et al. Biol Psych, 2005**

Figure . Drug Exposure and Age of Use in Risk of Developing Schizophrenia

Another recent study sponsored by the National Institute on Drug Abuse provides an example of the potential for personalized treatment for drug dependency. In this study, individuals with an alcohol dependency were treated with therapeutic drug Naltrexone. Naltrexone is commonly used for the treatment of alcohol and opioid dependence. Opioid Receptor Mu-1 (OPRM1) is a gene that encodes the mu opioid receptor26. This receptor is the primary site of action for the most commonly used opioids including morphine, heroin, methadone, and fentanyl26. It is also the primary receptor for endogenous opioid peptides beta-endorphin and enkephalins26. An allelic variant in this gene, ASN40ASP, is known to influence response to morphine-6- glucuronide and susceptibility to opioid dependence26. Individuals that had the Asp40 variant had a significantly lower rate of relapse (26.1%) than patients with Asn40 variant (47.9%)5 (Figure 3). With knowledge and use of genetics such as this, outcomes for treatment of alcohol and drug dependence could be improved.

**Adapted from Oslin et al. Neuropsychopharamacology, 2003**

Figure . Effects of Naltrexone on Rate of Relapse

Several other genes in the dopamine system may be associated with susceptibility. A study performed by Luo et al (2003) of 318 European Americans with alcohol and opioid dependence and 179 controls without dependence found a significant difference in haplotype frequency of alleles as OPRM1 locus26. The haplotypes included were associated with the susceptibility allele associated with substance dependence26. However, a study of the same haplotypes in 124 African Americans with substance abuse and 55 controls revealed no differences between the two groups26. The results of this study suggest that OPRM1 may play a part in the pathophysiology of substance dependence and also that this effect may be specific to certain populations, races, or ethnic groups26.

# Treatment

Many programs that specialize in the treatment of alcohol and/or drug addiction do so in a comprehensive manner. The programs focus on physical, psychosocial, spiritual, and sometimes pharmacological interventions9. Chemical dependency treatment focuses on the deficits created in an individual’s brain reward circuitry, memory, and motivation circuitry9. There are several treatment levels and strategies that programs use in their operations. Intensive Outpatient Programs (IOP) operate during day or evening hours. The interventions occur approximately 4 days a week for 3-4 hours each and are 4 to 6 weeks in duration. They involve small group therapy sessions, didactic and experimental presentations, family involvement, medical and psychiatric assessment and intervention, and 12-step involvement9. The next level of treatment is Partial Hospital Programs (PHP). These interventions occur 5 days a week for 6 to 8 hours each over a duration of 4 to 6 weeks as well9. Independent Living Programs (ILP) often accompany PHP programs. An example of this intervention would be a residential treatment program. The individual lives independently but with 24-hour supervision and under the same roof where the treatment is occurring9.

There are many facets of treatment programs that integrate a therapeutic community based on fellowship. For example, Alcoholics Anonymous and Narcotics Anonymous meetings and the 12-step program are a therapeutic community9. The 12 step-program assists people in developing new ways to redirect the reward system and create new memories in the brain9. Treatment strategies often include 12-step facilitation with lectures and group sessions explaining the program9. These sessions provide a platform for discussion and sharing. Cognitive behavioral therapy helps individuals identify thinking patterns that are dysfunctional and based on flawed logic9. It is used in individual as well as group sessions. This type of therapy aids in the identifying and redirecting of thought processes9. Motivational enhancement therapy motivates individuals who are addicts to move towards the goal of abstinence. This therapy progresses through steps based on the Transtheoretical model of behavior change or the Stages of Change Theory. These steps include pre-contemplation, contemplation, preparation, and finally, action. This strategy/approach breaks through the addict’s denial and increases his/her openness and desire to be helped. Meditation allows for the individual to focus on his/her inner-selves in the moment9. This treatment aids in the individual’s ability to move forward out of their addiction and not continue to live in the pain of the past. Medication management through the use of anti-craving medicine has proven efficacy in positive treatment outcomes9. Medications like Naltrexone, Suboxone, and methadone act as replacement therapy that limits cravings for substances such as alcohol and opiates9. Methadone is a schedule II opioid analesgic23. Methadone is a part of the harm-reduction model/program for heroin and opioid addicts. This means that in some cases methadone can reduce the mortality rate from overdoes from opioids. Methadone is sometimes viewed as harmful to individuals but a year 2001 study by Langendam et al. shows that harm reduction based treatment results in statistically significant lower rates of mortality due to overdoes amongst injection users31. Methadone clinics exist for individuals who abuse heroin and other opioids such as morphine, and prescription painkillers (oxycodone, hydrocodone, oxycontin, and vicodin) 23. Clinics such as these work in a way in which to eliminate or reduce the usage of these opioids. Suboxone is a combination of buprenorphine and naloxone used to treat opiate addiction as well. Buprenorphine is an opioid medication while naloxone is a narcotic drug that reverses the effects of other narcotics25. Naloxone is often used in emergency overdose situations to reverse the overdose24. It works to reverse these effects because it is a mixed agonist-antagonist opioid receptor modulator25. This means that at high doses it can slow the body’s reaction to a drug instead of speed it up. Naltrexone is an opioid receptor antagonist that works in opioid dependence as well as alcohol dependence24. It can be taken in tablet form as well as a shot.

# Sojourner House

This summer, my internship partner and I interned at Sojourner House. Sojourner House provides 6 months of in-patient residential treatment to addicted mothers and their children. To be eligible for the program, a woman must be a mother, homeless, and have a documented dual diagnosis of drug and/or alcohol addiction and a mental health disorder.

This program is unique because it allows mothers to bring their children into treatment with them. Research has shown that many mothers do not go into treatment because they do not want to lose or leave their children behind17. This program helps decrease the number of women needing treatment and also helps the children who have been living through their mother’s addiction. Sojourner House was founded to address the needs of this special, vulnerable population. Children of substance abusers are four times more likely than the children of non-addicts to become addicts themselves, 17 so it is important to also treat children of addicts in order to break the cycle of generational addiction. Because women in treatment report histories of repeated mental and physical abuse, this program offers mental heath treatment as well. Services that are provided include individual, group and family counseling, children’s programming, advocacy, linkages to community resources, parenting education, and life skills training for the women so that they can begin the first steps of recovery.

Since Sojourner House was founded in 1991, they have modified their in-patient treatment many times to meet the needs of the women participating in the program. During my internship, the staff educated me on the observed need for life skills training in those mothers who are addicted. Literature developed by Narcotics Anonymous is used in the Relapse Prevention group sessions and it was during these sessions that I learned emotional maturation is halted at the point in which abuse or trauma starts. This knowledge is key in the treatment of addiction and the execution of life skills training. Because many of these women experienced instances of trauma and abuse early in life, they are emotionally immature. Each participant within the program is assigned a life skills mentor and parent educator. There are countless life skills that they did not learn because of their addiction. Life skills training teaches the women the basic knowledge of how to run a household, personal hygiene, and respect for oneself and others. Parenting education is offered because many mothers have never parented their children while sober. It is especially difficult for the children to allow themselves to be parented due to the fact that they have only experienced their mothers under the influence of drugs. Some children have grown up being the parent and others have grown up without any type of discipline or even attention. Parenting education allows the mother and child to establish more common adult to child interactions. The child, as well as the mother, is able to develop connections, trust, and social-emotional growth through this aspect of treatment.

Sojourner House has an additional program called Sojourner House MOMS (Motivation Opportunities Mentoring Spirituality). MOMS is a recovery-support permanent housing program for mothers who are homeless, dually diagnosed with a mental health disorder and drug and/or alcohol addiction, and who have dependent children. MOMS provides a support community for the mothers along with continued recovery work towards self-sufficiency. The women are encouraged to work toward independence by setting goals for their recovery, mental health maintenance, employment and training, and family and personal self-sufficiency. This program was created because some mothers still require continued structure and support after they complete recovery programs. The transition from treatment to being a contributing member of a community can be challenging. The challenge sometimes lies in the people, places, and things that individuals in recovery have in their lives. The Narcotic Anonymous literature teaches the “people, places, and things” philosophy. In order to be successful in recovery, observations have demonstrated that an addict must have new people, places, and things. After a recovery program, an addict should not return to the same places they used to live in, be around the same people they used to be with, or have the same things they had while they were using. This program is difficult for a new mother in recovery especially considering the fact that they were often homeless when they entered recovery and may not have had a proper support system. When the treatment programs end, there is often nowhere new for them to go. Of participants from the Sojourner House in-patient program, 50% of participants from the 2009-10 fiscal year moved into supportive housing17. The MOMS program allows the mothers to have safe, affordable housing while being independent and running their own households. Many are able to hold part time or full time jobs because of the job training and education services MOMS offers. Mothers receive continued life skills and parenting counseling, case management, and referrals to community resources.

Over a period of 8 weeks, my fellow intern partner and I observed group sessions at Sojourner House and worked closely with the staff at Sojourner House MOMS. We were able to get an idea of what in-patient treatment was like. Spending time with the staff at MOMs allowed us to build a foundation of what resources are required to maintain a supportive-housing program. During this time, MOMs was in the process of integrating two other supportive housing programs that served the recovering addicted mothers population. The housing programs, Sankofa House and Open Arms, were previously operated by Primary Care Health Services through the Allegheny County Department of Human Services. Their mission was similar to that of Sojourner House MOMs, providing supportive housing for recovering mothers and children. The difference between MOMs and Sankofa and Open Arms was that Sankofa and Open Arms had 24 hour supervision and their visitation hours were different. This difference may have seemed small but it made for a major issue in curfew and visitation hours across all sites as well as the type of woman that would be accepted into that particular housing building. Some women entering into the MOMs program may require more or less supervision or support and may get along with or not get along with the type of women that were already living in these new programs that were acquired by MOMS. Because this was a time of transition for the MOMs program as well as mothers early in recovery, we needed to create a new participant handbook that would encompass aspects of each of the 3 supportive housing programs that would now be under the umbrella of Sojourner House. My internship partner and I created a transitional guide for women going from the highly structured treatment program to the recovery-support housing program. Women were required to exhibit more self-sufficiency in the recovery program. The handbook included the living, learning, and organizational styles of each of the three different recovery-housing programs along with an overview of the program, the expectations and responsibilities of residents, and the supportive resources available to the women and their children. The handbook serves as a resource for the staff and the participants to clarify their expectations and goals. There were many instances where the staff members were having problems with their clients adhering to the expectations of the program. There were inconsistencies among what staff members would allow their particular client to do or not do. These inconsistencies led to conflict as well as confusion amongst staff members and participants. Non-compliance to rules of the program resulted in write-ups, but in many cases exceptions were being made. There were issues with curfews for mothers, curfews for young children, and curfews for older children. These rules had to be developed and laid out within the new handbook. In discussions with women in the MOMs program, we discovered that they had a hard time coping with the greater amount of responsibility they had in recovery. For example, they were required to attend relapse prevention meetings and a several NA meetings a week but to do so, they would have to find babysitters for their kids. We wrote a babysitting clause within the handbook to provide direction for this issue. Due to the above situations and many others, we developed, in collaboration with staff, an easy to read, understandable guide that merged the best of three programs. Our goal was that new participants and staff would find the transition more manageable.

Our time spent at Sojourner House was fairly short so we did not see our Participant Handbook implemented. The staff at all three locations supported our creation but we did not get to see the response of the participants. The staff felt that many of their frustrations with the program were addressed well within the handbook. I would like to know if the participants felt their needs and concerns were addressed.

If we were to test the effectiveness of our handbook, I would start by interviewing both the new participants entering the program, as well as the established participants who are dealing with the essentially changing culture of their “home”. From these interviews, I would gain an understanding of what worked and what did not work and why. I would also consider holding focus groups of the participants to get the overall feedback on the participant handbook. By interviewing the participants and holding focus groups, I could gauge what more can be done to improve the handbook so that the women travel through the transition process as smoothly as possible.

# Personalized treatment

Knowledge of specific receptor gene variants an individual has may help predict the most effective treatment for them. This process is currently being done in the treatment of certain forms of cancer known to be genetic, such as individuals with variants in the BRCA1 and BRCA2 genes for breast cancer susceptibility. A similar process would be useful for the treatment of drug addiction. If genetic variants that influence drug metabolism can be identified, it could personalize an individual’s treatment for their addiction, whether they are living independently or in a treatment facility. Personalized medicine may address some of the variability that healthcare professionals are observing in the needs of their patients. Since part of this variability is due to genetics, pharmacogenomics and personalized medicine should be used to provide the correct treatment, medication dosages, and give less negative effects.

I propose that rehabilitation organizations and centers such as Sojourner House use genotyping to find the specific gene variants that their clients or patients possess. Rehabilitation organizations could partner with genetic counselors possessing the knowledge and skills to educate and counsel the patients on their specific genotype and what that could mean for their treatment outcomes. Knowing how a particular variant works with a particular type of treatment or medicine would greatly increase the individual’s chance of recovery and maybe even recovery without relapse. For example, as described previously, knowledge of an individuals OPRM1 genotype, may help determine whether the individual should receive naltrexone or another drug because their relapse rate may be higher on naltrexone. Organizations could partner with genetic testing companies as well and test those patients who are interested in knowing their genotype and receiving personalized/specialized treatment. Specialized treatment could change the outcomes for so many more individuals than just a standard version of care.

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