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Addiction and Mental Health Disorders

Currently, there is a high frequency co-occurrence of addiction and mental health issues nationwide. Within the United States, roughly 4% of all adults suffer from varying levels of co-occurring drug addiction and mental health issues.¹ This means that of the 20.8 million adults suffering from substance abuse disorder in the U.S., 42.8% have co-occurring mental illness.² A system of treatment that integrates substance addiction and mental health has emerged as an effective method of recovery for patients suffering from co-occurring illnesses. Joining addiction and mental health treatment creates a comprehensive recovery approach that is associated with a quicker recovery and a reduced risk of relapse.³ Although historically classified as separate health sectors, the integration of substance addiction and mental health treatment systems provides patients with comprehensive medical assistance and effective treatment systems. From integrated resource management schemes to provision of more successful addiction recovery treatment, there are a number of benefits associated with including substance abuse under the umbrella of mental health.⁴ For example, integrated treatment allows greater collaboration among specialists and doctors, thus increasing the likelihood of short and long-term patient recovery.⁵

In particular, the nationwide opioid addiction epidemic has resulted in staggering social and economic ramifications in the United States.⁶ Policymakers and health professionals argue that framing the opioid epidemic as a mental health issue will maximize recovery resources for both diseases, while also reducing the prevalence of opioid addiction.⁷ Studies have concluded that

¹ Substance Abuse and Mental Health Services Administration, Center for the Application of Prevention Technologies, *Preventing Prescription Drug Misuse: Understanding Who is at Risk*, U.S. Department of Health and Human Services (Rockville, Maryland), <https://www.samhsa.gov/capt/sites/default/files/resources/preventing-prescription-drug-misuse-understanding.pdf> (last updated May 2016).

² Substance Abuse and Mental Health Services Administration's Center for the Application of Prevention Technologies, *Preventing Prescription Drug Misuse*.

³ Christine E. Grella and Judith A. Stein, "Impact of program services on treatment outcomes of patients with comorbid mental and substance use disorders," *Psychiatric Services* 57, no.7 (2006): 1007–1015 doi: [10.1176/appi.ps.57.7.1007](https://doi.org/10.1176/appi.ps.57.7.1007).

⁴ Grella and Stein, "Impact of program services," 1007–1015.

⁵ Lena Lundgren et al., "Integrating addiction and mental health treatment within a national addiction treatment system: Using multiple statistical methods to analyze client and interviewer assessment of co-occurring mental health problems," *Nordic Studies on Alcohol and Drugs* 31, no. 1 (2017): 59-79, <https://doi.org/10.2478/nsad-2014-0005>.

⁶ Substance Abuse and Mental Health Services Administration's Center for the Application of Prevention Technologies, *Preventing Prescription Drug Misuse*.

⁷ Lena Lundgren et al., "Integrating addiction and mental health treatment."

addiction issues are partially a product of environmental factors that contribute to and exacerbate addictive tendencies.⁸ This report will analyze the systemic, biological, social and psychological influences that contribute to drug addiction, with a specific focus on opioid addiction due to the extensive research and attention paid to this specific spectrum of drug addiction.

Nationwide Opioid Epidemic

Opioids are classified as pharmaceutical drugs either derived naturally, from the opium poppy, or synthetically. Opioids are prescribed as a medical pain reliever to patients. The highly addictive nature of these drugs has resulted in a widespread epidemic.⁹ The National Institute on Drug Abuse, a part of the U.S Department of Health and Human Services, is a national research agency that is on the forefront of medical data assessment and analysis with the mission of improving science on the causes and consequences of drug abuse.¹⁰ The National Institute on Drug Abuse found that opioid overdose deaths rose significantly, increasing 2.8 fold annually from 2002 to 2015, with approximately 33,000 deaths in 2015.¹¹ Daily, there are over 115 deaths due to opioid driven overdoses.¹² The issue of opioid abuse and addiction has resulted in significant economic, social, and health concerns in the United States.¹³

Among health professionals, opioid addiction is considered a mental health disease that is caused by a multitude of external and systemic factors.¹⁴ Conventional treatment for the public health opioid crisis as outlined by the National Institute on Drug Abuse employs a three-pronged approach to suppressing the epidemic. The Institute identifies overdose reversal, addiction treatment, and pain management as the three critical points of leverage for future action.¹⁵ From increased education to improved access to naloxone, state legislatures across the country have enacted a variety of laws in order to tackle this issue through comprehensive lawmaking.¹⁶

⁸ Shoshana Eitan et al., “Opioid Addiction: Who are your real friends?” *Neuroscience & Biobehavioral Reviews*, no. 83 (2014): 190-196 doi: <https://doi.org/10.1016/j.neubiorev.2017.05.017>.

⁹ National Institute on Drug Abuse, *Opioid Overdose Crisis*, U.S. Department of Health and Human Services (Bethesda, Maryland), <https://www.drugabuse.gov/drugs-abuse/opioids/opioid-overdose-crisis> (last updated March 2018).

¹⁰ National Institutes of Health, *Institutes, Centers, and Offices*, U.S. Department of Health and Human Services (Bethesda, Maryland), <https://www.nih.gov/institutes-nih/list-nih-institutes-centers-offices> (last updated July 2017).

¹¹ National Institute on Drug Abuse, *Opioid Overdose Crisis*.

¹² National Institute on Drug Abuse, *Opioid Overdose Crisis*.

¹³ National Institute on Drug Abuse, *Opioid Overdose Crisis*.

¹⁴ Shoshana Eitan et al., “Opioid Addiction: Who are your real friends?” 190-196.

¹⁵ Nora Volkow and Francis Collins, ‘*All Scientific Hands on Deck*’ to End the Opioid Crisis, National Institute on Drug Abuse (Bethesda Maryland), <https://www.drugabuse.gov/about-nida/noras-blog/2017/05/all-scientific-hands-deck-to-end-opioid-crisis> (last updated May 2017).

¹⁶ “Prescribing Policies: States Confront Opioid Overdose Epidemic,” National Conference of State Legislatures, (Washington D.C.), April 5, 2018, <http://www.ncsl.org/research/health/prescribing-policies-states-confront-opioid-overdose-epidemic.aspx>.

Vermont Opioid Epidemic

From 2004 to 2013, the number of patient admissions into Vermont's opioid treatment facilities increased threefold.¹⁷ According to the Center of Disease Control (CDC) survey data, the annual increase in opioid related overdoses rose significantly from 9.7% in 2010 to 22.4% in 2015.¹⁸ According to the Vermont Department of Health, between 2015 and 2016 there was a 30% increase in opioid overdose-related deaths. In order to address the opioid epidemic, Vermont has instituted two federally funded programs: Preventions for States (PFS) and Enhanced State Opioid Overdose Surveillance (ESOOS).¹⁹ The PFS program, which was instituted by the CDC in 29 states, aims to mitigate prescription drug overdoses through providing comprehensive resources and necessary intervention mechanisms.²⁰ In conjunction with PFS, ESOOS provides information resources regarding fatal opioid and nonfatal opioid overdoses, allowing states to implement effective opioid overdose directed policy and regulations.²¹

Coupled with PFS and ESOOS, Vermont has increased statewide funding to foster treatment accessibility for opioid users through initiatives such as Care Alliance, as well as direct medical assistance therapy facilities.²² Care Alliance is a statewide initiative that aims to provide comprehensive treatment for patients suffering from opioid addiction that includes treatment centers, expert physicians, and coordinated support.²³ While these initiatives continue to increase treatment accessibility to Vermonters suffering from Opioid Use Disorder (OUD), the frequency of opioid overdoses in Vermont remains well above the national average.²⁴

In 2017, the Vermont Legislature passed legislation that created limits on opioid prescriptions, including a specific outline on daily maximums according to patient pain level.²⁵ The objective of the law was to “minimize opportunities for misuse, abuse and diversion and optimize prevention of addiction and overdoses” that had become an epidemic in Vermont over the past two decades.²⁶ Since the adoption of this legislation, the annual increase in opioid related overdoses has dropped significantly from 30% in 2016 to 5% in 2017.²⁷ This recent decrease in

¹⁷ Vermont Department of Health, *Treating Opioid Addiction*, Vermont Department of Health (Montpelier, Vermont), http://www.healthvermont.gov/sites/default/files/documents/2016/12/ADAP_Treat_Opioids_Brief.pdf (last updated December 2016).

¹⁸ Centers for Disease Control and Prevention, *Drug Overdose Death Data*, U.S. Department of Health and Human Services (Atlanta, Georgia), <https://www.cdc.gov/drugoverdose/data/statedeaths.html> (last updated December 2017).

¹⁹ Centers for Disease Control and Prevention, *Drug Overdose Death Data*.

²⁰ Centers for Disease Control and Prevention, *Prevention for States*, U.S. Department of Health and Human Services (Atlanta, Georgia), https://www.cdc.gov/drugoverdose/states/state_prevention.html (last updated October, 2017).

²¹ Centers for Disease Control and Prevention, *Enhanced State Opioid Overdose Surveillance*, U.S. Department of Health and Human Services (Atlanta, Georgia), <https://www.cdc.gov/drugoverdose/foa/state-opioid-mm.html> (last updated October, 2017).

²² Vermont Department of Health, *Treating Opioid Addiction*. Vermont

²³ Vermont Department of Health, *Care Alliance for Opioid Addiction*, Vermont Department of Health (Montpelier, Vermont), <http://www.gmunityway.org/wp-content/uploads/2016/05/care-alliance.pdf> (last updated 2014).

²⁴ Centers for Disease Control and Prevention, *Drug Overdose Death Data*.

²⁵ VT. REV. STAT. tit. 18, §4289-E (2017).

²⁶ VT. REV. STAT. tit. 18, §4289-E (2017).

²⁷ Centers for Disease Control and Prevention, *Drug Overdose Death Data*.

opioid overdose frequency following the recent legislation limiting opioid prescription practices and increasing treatment accessibility.²⁸

Biological Factors

Evidence suggests that it is often the case that individuals who are affected by substance use disorders also experience comorbid mental health disorders.²⁹ The importance of this point, especially in considering treatment, cannot be understated because 42.8% of individuals with substance abuse have at least one co-occurring psychiatric disorder.³⁰ Biological factors such as genetics and neurology interplay with drug addiction and substance abuse.

Two relevant influences on substance use and mental health disorders are genes, and consequently, monoamines.³¹ There are many studies that point towards the relevance of genetic factors in the development of addictions, and it has been found in many peer reviewed studies that addictions are heritable.³² Three particular monoamines—serotonin, norepinephrine, and dopamine—are essentially the modulators of emotionality, cognition, and reward.³³ Because these monoamines play an integral role in mental health, it is not surprising that gene-regulating monoamines, such as the serotonin transporter, “have been implicated in vulnerability to several psychiatric diseases, including addictions.”³⁴ The fact that these neurotransmitters, whose performance is determined by genetics, can implicate both mental illness and susceptibility to substance abuse is the essence of the gene issue in regards to this topic. A study that illuminates this issue was published in the *Journal of Psychiatric Clinics of North America* in 2012.³⁵ The authors explain that people who were separated from their mothers at an early age and had a serotonin abnormality displayed higher stress susceptibility and alcohol dependence.³⁶ This study highlights the crucial point that both genetics and the environment contribute to and predict addiction.

In addition, neurology can tell us a lot about why and how substance use disorders can occur. One relevant finding is related to the corticotrophin-releasing factor (CRF). CRF is the key hormone in stress response, which is involved with anxiety, affective, and addictive disorders.³⁷

Vermont Department of Health, *Opioid Related Fatalities*, Vermont Department of Health (Montpelier, Vermont), http://www.healthvermont.gov/sites/default/files/documents/pdf/ADAP_Data_Brief_Opioid_Related_Fatalities.pdf (April 2018).

²⁸Vermont Department of Health, *Opioid Related Fatalities*.

²⁹ Comorbidity is when an individual has two disorders simultaneously.

³⁰ Substance Abuse and Mental Health Services Administration’s Center for the Application of Prevention Technologies, *Preventing Prescription Drug Misuse*.

³¹ A monoamine is a compound that has a single amine group in its molecule, especially one that is a neurotransmitter like serotonin, norepinephrine, and dopamine.

³² Francesca Ducci and David Goldman, “The Genetic Basis of Addictive Disorders”, *Psychiatric Clinics of North America* 35, no. 2 (2012): 496, https://www.clinicalkey.com/service/content/pdf/watermarked/1-s2.0-S0193953X12000275.pdf?locale=en_US.

³³ Ducci and Goldman, “The Genetic Basis of Addictive Disorders.” 503.

³⁴ Ducci and Goldman, “The Genetic Basis of Addictive Disorders.” 504.

³⁵ Ducci and Goldman, “The Genetic Basis of Addictive Disorders.”

³⁶ Ducci and Goldman, “The Genetic Basis of Addictive Disorders.” 506.

³⁷ Kathleen T. Brady and Rajita Sinha “Co-Occurring Mental and Substance Use Disorders: The Neurobiological Effects of Chronic Stress”, *The American Journal of Psychiatry* 162, no. 8 (2005): 1483-1493, <https://doi.org/10.1176/appi.ajp.162.8.1483>

This is significant because with the increasing severity of addiction, neuroadaptations in stress and reward circuits can occur, and “these changes may underlie the increasing emotional distress often associated with substance use disorders.”³⁸ Furthermore, it has been found across many studies that stress can induce drug craving, which supports the allostatic view of drug addiction.³⁹ From an allostatic viewpoint, the addict’s body (including neurochemical stress releases) can only regain a perceived “normal state” by using drugs. This also acts as a stress reward circuit. Ultimately, the increased emotional distress, coupled with a substance use disorder, can lead to trauma or a mental health disorder.⁴⁰ Yet it should be noted that different abused drugs have widely varying effects on neurobiological systems, so the severity and type of mental issue(s) is often specifically drug dependent.⁴¹

In terms of mental health disorders that have been linked to substance use disorders, depression, PTSD, ADHD, and schizophrenia have been shown to affect the onset of substance use disorders. For example, because of stress and other neurological indicators, “individuals with major depression are more likely to develop substance use disorder and vice versa.”⁴² Related to the previous conversation about stress, it was also found that people with substance use disorders have difficulty managing stressful situations and emotional distress states and they often relapse in the face of stressful situations.⁴³ Furthermore, the association of anxiety and distress with biological stress responses suggests a mechanistic connection between depressive symptoms and substance use disorders.⁴⁴ Stress responses that are associated with PTSD and schizophrenia also increase the likelihood that the affected individual will delve into substance abuse.⁴⁵ It is also important to note the relationship between the ADHD spectrum and substance use disorders, especially because of the prevalence of these co-occurring in young people. For instance, researchers found “adolescents with comorbid substance use disorder and ADHD, conduct disorder, and/or oppositional defiant disorder have an earlier age at onset and more severe course of substance use disorder.”⁴⁶ Here it is important to understand that with ADHD and any of the previously mentioned disorders, it is the genetic, neurobiological, and psychological risk factors that contribute to the development of comorbid substance use disorders.

At the neurological level it is imperative to understand that certain people are more susceptible to comorbid substance use and mental disorders than others.⁴⁷ As result of this biological evidence, many scientists advocate change at the public policy level that would maximize the benefits derived from findings of neurobiological explanations in order to improve the lives of individuals with comorbidity.⁴⁸ There are also neurobiologists that argue that neuroimaging and

³⁸ Brady and Sinha, “Co-Occurring Mental and Substance Use Disorders,” 1484.

³⁹ Friedbert Weiss, “Neurobiology of Craving, Conditioned Reward and Relapse.” *Current Opinion in Pharmacology* 5, no.1 (2005): 15, <https://doi.org/10.1016/j.coph.2004.11.001>: Allostasis is the process by which the body respond to stressors in order to regain homeostasis.

⁴⁰ Brady and Sinha, “Co-Occurring Mental and Substance Use Disorders,” 1487.

⁴¹ Brady and Sinha, “Co-Occurring Mental and Substance Use Disorders,” 1484.

⁴² Brady and Sinha, “Co-Occurring Mental and Substance Use Disorders,” 1485.

⁴³ Brady and Sinha, “Co-Occurring Mental and Substance Use Disorders,” 1486.

⁴⁴ Brady and Sinha, “Co-Occurring Mental and Substance Use Disorders,” 1487.

⁴⁵ Brady and Sinha, “Co-Occurring Mental and Substance Use Disorders,” 1487.

⁴⁶ Brady and Sinha, “Co-Occurring Mental and Substance Use Disorders,” 1488.

⁴⁷ Brady and Sinha, “Co-Occurring Mental and Substance Use Disorders,” 1490.

⁴⁸ Brady and Sinha, “Co-Occurring Mental and Substance Use Disorders,” 1490.

neuro-psychological measures can be combined with genotype to help define new diagnostic categories encompassing both premorbid vulnerability and neurobiological change as result of addiction.⁴⁹ These kinds of solutions essentially seek to overcome the syndromic nature of diagnoses that are based on clusters of symptoms and clinical course, and which neglect to focus on and find the origin of the disease. Additionally, scientists argue that mental health diagnoses are categorical which assumes a cutoff between normal and abnormal, and this is a problem because many of the problems associated with addiction are found in people who fall below the disease-associated threshold.⁵⁰

Social and Psychological Factors

Understanding the social and psychological factors that affect addicts provides the basis for resolving several of the core issues that influence substance use disorders. With a wide range of variables, the following studies focus specifically on the social and psychological forces that result in initial and reoccurring addiction. In Table 1, we present an overview of the social and psychological peer-reviewed studies within this scope of concentration.

A literature review of 69 different drug addiction studies established that social networks remain the most significant determinant of addiction. The review advocated for a broad treatment system that addressed addict's behavior through multiple variables, thus providing a more comprehensive approach to patient recovery (Table 1, row 6, row 7).⁵¹ In contrast, a randomized study that investigated opioid addiction showed that factors including mental health history and current psychotropic medication use are important considerations that medical professionals should consider before prescribing opioids. This study stated that the patient's mental health history should be vetted completely in order to mitigate the risk of contributing to addictive behaviors (Table 1, row 9).⁵² In an attempt to identify opioid abusers, one observational study found that opioid addicts are more likely to pay in cash than with a credit card (Table 2, row 10).⁵³ In addition, a literature review found that education level and proficiency have a strong association with adolescent vulnerability to opioid abuse and addiction (Table 1, row 11).⁵⁴

In a survey designed and conducted by medical professionals, dependence and addiction on opioids were correlated to the prevalence of alcoholism within the family environment (Table 1, row 1).⁵⁵ Additionally, a similar literature review concluded that limited social interaction within a family during children's early developmental phase can increase their risk of drug use and

⁴⁹ Ducci and Goldman, "The Genetic Basis of Addictive Disorders." 511.

⁵⁰ Ducci and Goldman, "The Genetic Basis of Addictive Disorders." 511.

⁵¹ Joseph Cox et al., "The importance of social networks in their association to drug equipment sharing among injection drug users: A review," *Addiction* 102, no. 11 (2007): 1730-39, <https://doi.org/10.1111/j.1360-0443.2007.01936.x>.

⁵² J.A. Boscarino et al., "Risk factors for drug dependence among out-patients on opioid therapy in a large US health-care system," *Addiction* 105, no. 10 (2010): 1776-82, <https://doi.org/10.1111/j.1360-0443.2010.03052.x>.

⁵³ Devon Brewer et al., "A meta-analysis of predictors of continued drug use during and after treatment for opiate addiction," *Addiction* 93, no. 1 (2002): 72-92, <https://doi.org/10.1046/j.1360-0443.1998.931738.x>.

⁵⁴ Jeremy Arkes and Martin Iquchi, "How Predictors of Prescription Drug Abuse Vary by Age," *Journal of Drug Issues* 38, no. 4 (2008): 1027-43, <https://doi.org/10.1177/002204260803800405>.

⁵⁵ J.F. Maddux and D.P. Desmond, "Family and environment in the choice of opioid dependence or alcoholism," *American Journal of Drug and Alcohol Abuse* 15, no. 2 (1989): 117-134 <https://doi.org/10.3109/00952998909092716>.

alcohol addiction (Table 1, row 2, row 8).⁵⁶ A survey of adolescents using multiple addictive substances found that the combination of peer influence and substance using family members escalated susceptibility to addiction among children (Table 1, row 3, row 4).⁵⁷ In a five year study of 226 narcotic addicts, medical examiners concluded that adverse family circumstances including divorce or family disruption (prior to ages 12-14) increase the probability that the child will develop future deviant behavior leading to juvenile delinquency and narcotic addiction.⁵⁸ Drug vulnerability was explored in a study of reoccurring drug abusers. They concluded that siblings who were drug users as adolescents were “five times as likely to be drug abusers as adults” compared to siblings that did not become drug abusers as adolescents (Table 1, row 5).⁵⁹ These studies reinforce the claim that social interactions and family environment – such as family members with substance abuse disorders including alcoholism, low levels of social interaction during developmental years, and familial disruption--result in a higher incidence of drug and alcohol addiction.

⁵⁶ Michael T. Bardo, Janet L. Neisewander, and T. H. Kelly, “Individual differences and social influences on the neurobehavioral pharmacology of abused drugs,” *The American Society for Pharmacology and Experimental Therapeutics*, no. 65 (2013): 225-90, doi: [10.1124/pr.111.005124](https://doi.org/10.1124/pr.111.005124).

⁵⁷ Beth Russel et al., “Social Influence on Adolescent Polysubstance Use: The Escalation to Opioid Use,” *Substance Use and Misuse* 50, no.10 (2015): 1325-31, doi: [10.3109/10826084.2015.1013128](https://doi.org/10.3109/10826084.2015.1013128).

⁵⁸ David Nurcoa et al., “Differential contributions of family and peer factors to the etiology of narcotic addiction,” *Drug and Alcohol Dependence* 51, no. 3 (1998): 229-237, doi: [https://doi.org/10.1016/S0376-8716\(98\)00041-6](https://doi.org/10.1016/S0376-8716(98)00041-6).

⁵⁹ Suniya Luthar et al., “Vulnerability to drug abuse among opioid addicts' siblings: Individual, familial, and peer influences,” *Comprehensive Psychiatry* 33, no. 3 (1992): 190-196, [https://doi.org/10.1016/0010-440X\(92\)90029-P](https://doi.org/10.1016/0010-440X(92)90029-P).

Table 1: Social and Psychological Studies

<i>Title</i>	<i>Journal</i>	<i>Conclusion</i>	<i>Methodology</i>
1 “Family and environment in the choice of opioid dependence or alcoholism” (1989) ⁶⁰	<i>American Journal of Drug and Alcohol Abuse</i>	“The lifetime prevalence of opioid dependence among their family members was found to be 8.4%, markedly exceeding the estimated lifetime prevalence of 0.9% in the general adult population.” ⁶¹	An observational study with a sample size of 235 interviewees.
2 “Individual differences and social influences on the neurobehavioral pharmacology of abused drugs” (2013) ⁶²	<i>The American Society for Pharmacology and Experimental Therapeutics</i>	Providing prosocial behaviors, such as a stimulating environment can help to delay and mitigate adolescent addictive drug use. ⁶³	Literature review.
3 “Social Influence on Adolescent Polysubstance Use: The Escalation to Opioid Use” (2015) ⁶⁴	<i>Substance Use and Misuse</i>	“Students enrolled in recovery high school programs are likely from substance-using families and have combined complex constellations of substances including opioids by dint of their relationships with substance-using peers.” ⁶⁵	“A sample of 31 adolescents enrolled in substance use recovery high schools were surveyed on their patterns of substance use leading to their abuse of opioids.” ⁶⁶

⁶⁰ Maddux and Desmond, “Family and environment,” 117-134.

⁶¹ Maddux and Desmond, “Family and environment,” 117-134

⁶² Michael T. Bardo, “Individual differences and social influences,” 1-10.

⁶³ Michael T. Bardo, “Individual differences and social influences,” 1-10.

⁶⁴ Beth Russel et al., “Social Influence on Adolescent,” 1325-31.

⁶⁵ Beth Russel et al., “Social Influence on Adolescent,” 1325-31.

⁶⁶ Beth Russel et al., “Social Influence on Adolescent,” 1325-31.

	<i>Title</i>	<i>Journal</i>	<i>Conclusion</i>	<i>Methodology</i>
4	“Differential contributions of family and peer factors to the etiology of narcotic addiction” (1998) ⁶⁷	<i>Drug and Alcohol Dependence</i>	“Adolescents who come from disrupted families or even the perception of a negative home atmosphere and lower social support are typically show increased drug abuse.” ⁶⁸	“This retrospective study investigated relationships among early family circumstances, peer association and narcotic addiction over 5 year with a sample of 601 males.” ⁶⁹
5	“Vulnerability to drug abuse among opioid addicts' siblings: Individual, familial, and peer influences.” (1992) ⁷⁰	<i>Comprehensive Psychiatry</i>	The risk of opioid-abuse among individuals of peer group imposes greater risk upon those who are non-opioid abuser, but part of the same peer group. ⁷¹	Vulnerability to drug abuse was explored among 132 siblings of opioid-addicted probands over 2 years.
6	“The importance of social networks in their association to drug equipment sharing among injection drug users: A review” (2007) ⁷²	<i>Addiction</i>	“Social network characteristics are associated with drug injection risk behaviors and should be considered alongside personal risk behaviors in prevention programs.” ⁷³	Literature Review.
7	“A meta-analysis of predictors of continued drug use during and after treatment for opiate addiction” (1998) ⁷⁴	<i>Addiction</i>	“Within samples of individuals seeking treatment for substance use disorder, higher levels of natural social support are positively associated with more favorable drug use outcomes.” ⁷⁵	Literature Review.

⁶⁷ David Nurcoa, “Differential contributions of family and peer factors,” 229-37.

⁶⁸ Shoshana Eitan et al., “Opioid Addiction: Who are your real friends?” 190-196.

⁶⁹ David Nurcoa, “Differential contributions of family and peer factors,” 229-37.

⁷⁰ Suniya Luthar et al., “Vulnerability to drug abuse,” 190-196.

⁷¹ Shoshana Eitan et al., “Opioid Addiction: Who are your real friends?” 190-196.

⁷² Joseph Cox et al., “The importance of social networks,” 1730-39.

⁷³ Shoshana Eitan et al., “Opioid Addiction: Who are your real friends?” 190-196.

⁷⁴ Devon Brewer et al., “A meta-analysis of predictors,” 72-92.

⁷⁵ Michael Kidorf et al., “Presence of Drug-Free Family and Friends in the Personal Social Networks of People Receiving Treatment for Opioid Use Disorder,” *Journal of Substance Abuse Treatment* 70, (2016): 87-92, <https://doi.org/10.1016/j.jsat.2016.08.013>.

	<i>Title</i>	<i>Journal</i>	<i>Conclusion</i>	<i>Methodology</i>
8	“Presence of Drug-Free Family and Friends in the Personal Social Networks of People Receiving Treatment for Opioid Use Disorder” (2016) ⁷⁶	<i>Journal of Substance Abuse</i>	“Activating drug-free family and friends provides a potential pathway to help people with substance use disorder access and benefit from community support.” ⁷⁷	Observational study that evaluated the influence of social networks and addiction treatment using 355 samples. ⁷⁸
9	“Risk factors for drug dependence among out-patients on opioid therapy in a large US health-care system” (2010) ⁷⁹	<i>Addiction</i>	A history of depression is linked to opioid addiction. ⁸⁰	“Identified out-patients receiving 4+ physician orders for opioid therapy in the past 12 months for non-cancer pain within a large US health-care system. We completed diagnostic interviews with 705 of these patients to identify opioid use disorders and assess risk factors.” ⁸¹
10	“Comparison of the Risks of Shopping Behavior and Opioid Abuse Between Tapentadol and Oxycodone and Association of Shopping Behavior and Opioid Use” (2014) ⁸²	<i>The Clinical Journal of Pain</i>	There is an association between paying for prescriptions in cash and a higher incidence of prescription opioid abuse. ⁸³	A retrospective cohort study that followed opioid patients (277,410 participants) and their shopping behavior for 1 year. ⁸⁴
11	“How Predictors of Prescription Drug Abuse Vary by Age” (2008) ⁸⁵	<i>The Journal of Drug Issues</i>	“Individuals who commit to doing well and finishing school are less likely to misuse prescription drugs.	Literature Review.

⁷⁶ Michael Kidorf et al., “Presence of Drug-Free Family and Friends,” 87-92.

⁷⁷ Michael Kidorf et al., “Presence of Drug-Free Family and Friends,” 87-92.

⁷⁸ Michael Kidorf et al., “Presence of Drug-Free Family and Friends,” 87-92.

⁷⁹ J.A. Boscarino et al., “Risk factors for drug dependence among out-patients on opioid therapy in a large US health-care system,” *Addiction* 105, no. 10 (2010): 1776-82, <https://doi.org/10.1111/j.1360-0443.2010.03052.x>.

⁸⁰ Substance Abuse and Mental Health Services Administration’s Center for the Application of Prevention Technologies, *Preventing Prescription Drug Misuse*.

⁸¹ Substance Abuse and Mental Health Services Administration’s Center for the Application of Prevention Technologies, *Preventing Prescription Drug Misuse*.

⁸² Soledad Cepeda et al., “Comparison of the Risks of Shopping Behavior and Opioid Abuse Between Tapentadol and Oxycodone and Association of Shopping Behavior and Opioid Abuse,” *The Clinical Journal of Pain* 30, no. 12 (2014): 1051-56 doi: 10.1097/AJP.000000000000067; Dasgupta et al., “Breaking the News or Fueling the Epidemic? Temporal Association between News Media Report Volume and Opioid related Mortality,” *PLOS* 4, no. 11 (2009), <https://doi.org/10.1371/journal.pone.0007758>.

⁸³ Substance Abuse and Mental Health Services Administration’s Center for the Application of Prevention Technologies, *Preventing Prescription Drug Misuse*.

⁸⁴ Cepeda et al., “Comparison of the Risks of Shopping Behavior,” 1051-56.

⁸⁵ Jeremy Arkes and Martin Iquchi, “How Predictors of Prescription Drug Abuse Vary by Age,” *Journal of Drug Issues* 38, no. 4 (2008): 1027-43, <https://doi.org/10.1177/002204260803800405>.

<i>Title</i>	<i>Journal</i>	<i>Conclusion</i>	<i>Methodology</i>
		These include individuals who are current students, have a high school diploma, or have attended a prevention class. ⁸⁶	

⁸⁶ Substance Abuse and Mental Health Services Administration's Center for the Application of Prevention Technologies, *Preventing Prescription Drug Misuse*.

Systemic Factors

The Substance Abuse and Mental Health Administration lists nonmedical use of prescription pain killers as the second most common type of drug use in the United States.⁸⁷ Factors like the over prescription of opioids in emergency rooms, and the manner in which these prescription drugs are marketed, further contribute to the United States' growing opioid epidemic.⁸⁸ The following peer reviewed studies have examined aspects of both the pharmaceutical and medical industries in attempts to determine what parts of the U.S. health care system might be exacerbating the epidemic.

In a study regarding the frequency of opioid prescriptions that utilized data collected in the National Hospital Ambulatory Care Survey from 2001 to 2010 (Table 2, Row 1), Mazer-Amirshahi et al. concluded that there had been a significant increase in opioid prescriptions for emergency department visits despite there only being "...a modest increase in pain related complaints."⁸⁹ These findings were reinforced by a study performed in 2012 that examined the frequency at which opioids were prescribed for "acute painful conditions" over a 5 month period (Table 2, Row 2).⁹⁰ In that study Hoppe et al. concluded that opiates were being provided to emergency department patients in almost half of all cases of intense pain.⁹¹ Researchers also concluded that patients who had never used opiates were put at an increased risk for recurrent, nonmedical, opioid use after receiving a prescription from a doctor.⁹²

Butler et al. performed a study in 2015 in which they used patients in a particular emergency department who were identified as using heroin or opioids for non-medicinal use (Table 2, Row 3).⁹³ Researchers noted that a significant number of these patients first experienced opioids through a medical prescription.⁹⁴ While this study had several limitations, namely the sample size and the fact that it was only conducted in one emergency department, the data collected from the study raise important questions regarding the roots of opioid addiction and the role that opioid prescriptions play in the onset of these addictions.⁹⁵

Between 2010 and 2012, another study examined heroin users' introduction to opiates. Researchers found that a majority of heroin users under the age of forty were introduced to

⁸⁷ Kathryn Tracy, "An Exploration of Opioid Use in the United States," University of Massachusetts, Amherst, (Amherst, Massachusetts), 2016, 4, https://www.umass.edu/sphhs-online/sites/default/files/PDFs/opioid_use_in_the_us.pdf.

⁸⁸ Tracy, "An Exploration of Opioid Use," 9.

⁸⁹ Maryann Mazer-Amirshahi et al., "Rising Opioid Prescribing in Adult U.S. Emergency Department Visits: 2001-2010," *Academic Emergency Medicine* 21, no. 3 (March 2014): 236, <https://doi.org/10.1111/acem.12328>.

⁹⁰ Jason A. Hoppe, Howard Kim, and Kennon Heard, "Association of Emergency Department Opioid Initiation with Recurrent Opioid Use," *Annals of Emergency Medicine* 65, no. 5, (May, 2015): 493, <https://doi.org/10.1016/j.annemergmed.2014.11.015>.

⁹¹ Hoppe et al., "Association of Emergency Department Opioid Initiation," 497.

⁹² Hoppe et al., "Association of Emergency Department Opioid Initiation," 496.

⁹³ Megan M. Butler et al., "Emergency Department Prescription Opioids as an Initial Exposure Preceding Addiction," *Annals of Emergency Medicine* 68, no. 2, (August 2016): 203, <https://doi.org/10.1016/j.annemergmed.2015.11.033>.

⁹⁴ Butler et al., "Emergency Department Prescription Opioids as an Initial Exposure Preceding Addiction," 202.

⁹⁵ Tracy, "An Exploration of Opioid Use in the United States," 9.

opiates through prescription pills (Table 2, Row 4).⁹⁶ Younger heroin users (aged 29 and below) noted that they had switched to heroin after prescription opiates became unavailable to them, either due to cost or limited prescriptions.⁹⁷ Another factor that heroin users noted were the extremely addictive properties of prescription opiates that caused them to become reliant on the substance.⁹⁸ Mars et al. hypothesized that this pathway to heroin addiction could have been partially caused by a 500% increase in opiate prescriptions from 1997 to 2005.⁹⁹

In a 2015 study that examined opioid use in Ontario, Canada, Eibl et al. concluded that the lack of social support and mental health services in rural areas correlated with a reduced percentage of opiate abusers seeking treatment (Table 2, Row 5).¹⁰⁰ Conversely, the presence of accessible treatment facilities in urban areas correlated with more people seeking treatment for addiction, indicating that the accessibility of treatment facilities is directly linked to the likelihood that someone with opiate use disorder will seek treatment.¹⁰¹

Although the over-prescription of opioids and accessibility to treatment facilities are important factors contributing to the opioid epidemic, the manner in which opioids are marketed by the pharmaceutical industry can play a comparable role in either exacerbating or reducing the opioid epidemic. Educational intervention programs, as well as programs like PROSPER, which aim to provide preventative intervention for opioids in school, community, and family settings, have been proven to lower the rate of participants who improperly use opioids.¹⁰² Educational intervention is the process of educating medical professionals to generally be more observant of their patients in regards to whom they prescribe opiates to and how often. Along with this, educational intervention promotes the use of alternative treatments for pain and the use of strict regimens when prescribing painkillers.¹⁰³ Marketing strategies by the pharmaceutical and health industry can just as easily prove detrimental to the existing opioid crisis. Between 1995 and 2006, Purdue Pharma ran a marketing campaign that encouraged the use of opioids for non-cancer related pain.¹⁰⁴ This campaign was supported by the American Pain Society, as well as the Joint Commission—a non-profit organization that accredits thousands of U.S. health care organizations. Both of these organizations supported aggressive treatment of pain through the use of opiates until the patient has a “pain score” of zero.¹⁰⁵

⁹⁶ Sarah G. Mars et al., “Every ‘Never’ I Ever Said came True: Transitions from Opioid Pills to Heroin Injecting,” *International Journal of Drug Policy* 25, no. 2 (March 2014): 1, <https://doi.org/10.1016/j.drugpo.2013.10.004>.

⁹⁷ Mars et al., “Transitions from Opioid Pills to Heroin Injecting,” 7.

⁹⁸ Mars et al., “Transitions from Opioid Pills to Heroin Injecting,” 1.

⁹⁹ Mars et al., “Transitions from Opioid Pills to Heroin Injecting,” 1.

¹⁰⁰ Joseph K. Eibl et al., “Evaluating the Effectiveness of First-Time Methadone Maintenance Therapy Across Northern, Rural, and Urban Regions of Ontario, Canada,” *Journal of Addiction Medication* 9, no. 6, (December 2015): 440, <https://dx.doi.org/10.1097%2FADM.0000000000000156>.

¹⁰¹ Eibl et al., “Evaluating the Effectiveness of First-Time Methadone,” 440.

¹⁰² Shannon Miller, “A Systemic Review: the Opioid Epidemic,” University of Kentucky, (Lexington Kentucky), April 12, 2017, 11, <https://www.uky.edu/publichealth/sites/www.uky.edu/publichealth/files/CEPH/ERF/BPH%20Capstone%20-%20Miller.pdf>.

¹⁰³ Miller, “A Systemic Review: The Opioid Epidemic,” 11.

¹⁰⁴ Tracy, “An Exploration of Opioid Use in the United States,” 9.

¹⁰⁵ Tracy, “An Exploration of Opioid Use in the United States,” 10.

Furthermore, an under-examined factor in the opioid crisis is the increasing importance of patient satisfaction scores in healthcare surveys like HCAPS—a health care survey created by Medicare and Medicaid services.¹⁰⁶ Pain management is one topic often addressed in patient satisfaction surveys, and the survey results are usually publicly reported and correlate with hospital reimbursement.¹⁰⁷ Thus, healthcare models are incentivizing hospitals to treat pain as thoroughly as possible, regardless of the potential consequences.

Another systemic factor regarding the prevalence of the opioid crisis is its presentation in the media. A study conducted by Dasgupta, Mandl, and Brownstein examined unintentional deaths involving opioids from 1999 to 2005 in the United States and the ways in which these deaths correlated with the presentation of opioids in the news media (Table 2, Row 6).¹⁰⁸ Researchers utilized google search archives to obtain approximately 24,000 news articles relating to opioid abuse. Ultimately, Dasgupta, Mandl, and Brownstein concluded that heavy news media coverage of opioids, regardless of whether the coverage was positive or negative, preceded a rise in overdose deaths by two to six months and that news media could be a significant predictor in regards to opiate misuse and overdose.¹⁰⁹ The researchers also noted the prevalence of news articles that could unintentionally endorse opioid misuse.¹¹⁰

¹⁰⁶ Tracy, “An Exploration of Opioid Use in the United States,” 11.

¹⁰⁷ Tracy, “An Exploration of Opioid Use in the United States,” 11.

¹⁰⁸ Nabarun Dasgupta, Kenneth D. Mandl, and John S. Brownstein “Breaking the News or Fueling the Epidemic? Temporal Association between News Media Report Volume and Opioid related Mortality,” *PLOS One* 4, no. 11, (November 2009): 1, <https://doi.org/10.1371/journal.pone.0007758>

¹⁰⁹ Dasgupta, Mandl, and Brownstein, “Breaking the News or Fueling the Epidemic?” 3.

¹¹⁰ Dasgupta, Mandl, and Brownstein, “Breaking the News or Fueling the Epidemic?” 5.

Table 2: Systemic Studies

	<i>Title</i>	<i>Journal</i>	<i>Conclusion</i>	<i>Methodology</i>
1	“Rising Opioid Prescribing in Adult U.S. Emergency Department Visits: 2001-2010” (2014) ¹¹¹	<i>Academic Emergency Medicine</i>	Opioid prescribing for Emergency Department visits increased from 20.8% to 30% between 2001 and 2010. ¹¹²	Researchers used data collected from the National Hospital Ambulatory Medical Care Survey of Emergency Department visits from 2001-2010, to examine trends of 6 commonly prescribed opioids.
2	“Association of Emergency Department Opioid Initiation with Recurrent Opioid Use” (2015) ¹¹³	<i>Annals of Emergency Medicine</i>	31% of patients to an urban emergency department received opioid prescriptions, 12 % went on to continuously fill those prescriptions. ¹¹⁴	Researchers collected data from Colorado’s prescription drug monitoring program during a 5-month period of time. They observed 4,801 patients who were treated for pain, 775 of whom received opiate prescriptions, and 299 of those used those prescriptions recurrently.
3	“Emergency Department Prescription Opioids as an Initial Exposure Preceding Addiction” (2016) ¹¹⁵	<i>Annals of Emergency Medicine</i>	A majority of heroin addicts interviewed in an emergency room stated that their first introduction to opioids came from a medical prescription. ¹¹⁶	A cross-sectional controlled study that surveyed 59 patients who reported nonmedical use of opiates in an urban Emergency Department.
4	“Every ‘Never’ I Ever Said Came True”: Transitions from Opioid Pills to Heroin Injection” (2014) ¹¹⁷	<i>International Journal of Drug Policy</i>	A majority of younger Heroin users interviewed in Philadelphia and San Francisco were introduced to opiates through prescriptions. ¹¹⁸	Researchers collected qualitative interviews from 41 nonmedical opiate users in San Francisco and Philadelphia.
5	“Evaluating the Effectiveness of First-Time Methadone Maintenance Therapy Across Northern, Rural, and Urban Regions of Ontario, Canada” (2015) ¹¹⁹	<i>Journal of Addiction Medicine</i>	Addicts who have increased access to addiction therapy services are more likely to continue using those services. ¹²⁰	Researchers analyzed the data of 17,211 patients, collected from administrative health care databases in urban and rural Ontario, Canada regarding patients’ use of

¹¹¹ Mazer-Amirshahi et al., “Rising Opioid Prescribing,” 236.

¹¹² Mazer-Amirshahi et al., “Rising Opioid Prescribing,” 237.

¹¹³ Hoppe et al., “Association of Emergency Department Opioid Initiation,” 497.

¹¹⁴ Hoppe et al., “Association of Emergency Department Opioid Initiation,” 497.

¹¹⁵ Butler et al., “Emergency Department Prescription Opioids,” 203.

¹¹⁶ Butler et al., “Emergency Department Prescription Opioids,” 203.

¹¹⁷ Mars et al., “Transitions from Opioid Pills to Heroin Injecting,” 7.

¹¹⁸ Mars et al., “Transitions from Opioid Pills to Heroin Injecting,” 7.

¹¹⁹ Eibl et al., “Evaluating the Effectiveness of First-Time Methadone,” 440.

¹²⁰ Eibl et al., “Evaluating the Effectiveness of First-Time Methadone,” 440.

<i>Title</i>	<i>Journal</i>	<i>Conclusion</i>	<i>Methodology</i>
6 “Breaking the News or Fueling the Epidemic? Temporal Association between News Media Report Volume and Opioid-Related Mortality” (2009) ¹²¹	<i>PLoS One</i>	Heavy news media coverage of opioids, whether positive or negative, can be a significant predictor of a rise in opiate misuses and overdoses in the following 2 to 6 months. ¹²²	opiate addiction therapy between 2003 and 2012. Researchers compared monthly time series of opiate overdoses in the U.S. from 1999-2005, with monthly counts of English language news articles relating to prescription opiates.

¹²¹ Dasgupta, Mandl, and Brownstein, “Breaking the News or Fueling the Epidemic?,” 5.

¹²² Dasgupta, Mandl, and Brownstein, “Breaking the News or Fueling the Epidemic?,” 5.

Conclusion

The co-occurring addiction and mental health crisis—most prominently in the form of the opioid crisis—that exists in the United States today is a result of the combination of a number of biological, social, psychological, and systemic factors. An amalgamation of issues such as aggressive marketing of painkillers by pharmaceutical industries, over prescription of opioids by hospitals, pre-existing mental conditions in those who use drugs, the pre-conditioning of a user’s social networks, and one’s access to health care are all problems exacerbating this crisis. Increasing the availability of addiction treatment, as well as decreasing opiate prescriptions to patients who have never received an opiate prescription, have both proven to be effective solutions in regards containing spread of this crisis.¹²³

This report was completed on July 23, 2018, by Brian Angel, Noah Boland, and Elie Jordi under the supervision of Professor Jack Gierzynski and Professor Robert Bartlett with the assistance of Research Assistant Catherine Curran-Groome in response to a request from Representative Brian Cina.

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¹²³ Hoppe et al., “Association of Emergency Department Opioid Initiation,” 496.