



## Substance Use Disorders in Pregnancy: A Chance to Break the Cycle

# Understanding Maternal Substance Use Disorders and Addiction



### CONTENTS

INTRODUCTION.....	1
IMPACT OF SUBSTANCE USE DURING PREGNANCY .....	1
CONTRIBUTING FACTORS .....	3
Adverse Childhood Experiences (ACEs) .....	3
Genetics.....	3
Disease Factors.....	3
Gender Differences .....	4
PARENTING – AN INTERGENERATIONAL ISSUE.....	5
TREATMENT IS EFFECTIVE .....	6
SUMMARY .....	6
REFERENCES .....	6

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### INTRODUCTION

Infant Mental Health encompasses prevention, promotion, early intervention and treatment of social and emotional issues with young children. Prevention of infant mental health disorders may be achieved by adequately addressing maternal substance use disorders and addiction.

Pregnancy outcomes and subsequent parenting can be negatively impacted by substance use and can be very detrimental to the unborn or developing fetus. Women with substance use disorders (SUD) during pregnancy likely have a series of contributing factors, including their own childhood experiences, exposure to trauma, and genetic predispositions to addiction. The purpose of this paper is to help practitioners better understand these contributing factors thereby increasing their understanding of the challenges that these women are facing. This additional knowledge may increase the practitioners' ability to be of greater assistance as they work with women to recover from this disorder and have a healthy baby.

Motivation to stop alcohol and other drug use is high during pregnancy. Researchers have found that pregnant women were more than four times as likely as non-pregnant women to express greater motivation for treatment.<sup>1</sup> Addressing substance use disorders during pregnancy can both reduce the impact on the unborn child and help enable the woman to be better prepared to parent her infant.

### IMPACT OF SUBSTANCE USE DURING PREGNANCY

The increased use of substances during pregnancy is a critical public health challenge in Florida. According to the Pregnancy Risk Assessment Monitoring System, the prevalence of new mothers using alcohol during pregnancy has increased by 68.1%, from 4.7% in 2000 to 7.9% in 2011.<sup>2</sup> The final report of the Florida Statewide Task Force on Prescription Drug Abuse & Newborns, released in February of 2013, includes an estimate of the number of Neonatal Abstinence Syndrome (NAS) cases in Florida from 2007 to 2011 using two ICD-9 hospital discharge codes (779.5 - drug withdrawal syndrome in newborn) and



(760.72 - noxious influences affecting fetus or newborn via placenta or breast milk, narcotics). The report shows a three-fold increase in NAS cases with 536 cases in 2007 and 1,563 cases in 2011. Given the 207,710 live births in 2011, there were 7.52 newborns per 1,000 live births diagnosed with NAS. The report also indicates that “there is no statewide standardization for the diagnosis and reporting of substance exposed newborns,” thus these figures are very likely underestimates of actual cases.<sup>3</sup> In 2008, the mean cost per infant with NAS was \$53,400 with 78% of the cost borne by Medicaid.<sup>4</sup> The use of drugs, including alcohol and nicotine, can have a significant impact on the unborn fetus. For example:

- Babies of mothers who smoked during pregnancy may have low birth weight. Children with certain genotypes, who are exposed to nicotine in utero, are also at risk for developing anti-social behavior as teens.<sup>5</sup> Additionally, studies have shown these children can have difficulties processing auditory information.<sup>6</sup>



- Pregnant women who drink alcohol can have children with Fetal Alcohol Spectrum Disorder (FASD). The nature and extent of the disorder depends on the period of fetal development in which alcohol exposure occurs. No amount of alcohol consumed during pregnancy is considered safe and alcohol consumed in early pregnancy results in the most damage. Children with FASD can have problems taking in and storing information, retrieving stored information, and using information in certain situations. These impairments can lead to secondary problems, such as substance abuse and

mental health disabilities, as well as unemployment, dependent living, and criminal behavior.<sup>7</sup> Prevalence of full spectrum of FASD is estimated at 9.1 per 1000 live births<sup>8</sup> with the health costs estimated at 9 times higher than for children without FASD.<sup>9</sup>

- The impact of exposure to cocaine during fetal development is difficult to determine, since so many factors can interact to influence fetal and child outcomes. Still, scientists using sophisticated technologies have begun to find that such in utero exposure can lead to deficits in areas of cognitive performance, information processing, and attention to tasks. Also, a number of studies have found a higher than usual incidence of premature births among mothers who abused cocaine during pregnancy, adding this risk factor to these other concerns.<sup>10</sup> Regular cocaine exposure during pregnancy puts the fetus at serious risk of Intrauterine Growth Restriction.
- Prenatal methamphetamine exposure has been linked to higher emotional reactivity and anxiety/depression in children by age 5, as well as to a higher incidence of externalizing behaviors (e.g., defiance and aggression) and attention deficit/hyperactivity disorder (ADHD). These children also scored lower than normal on a test of inhibitory control. This inability to resist an initial impulse and to stay focused raises concerns about future academic and psychosocial success.<sup>11</sup>
- Children whose mothers abused opioids during pregnancy experience neonatal opioid withdrawal and can develop neurobehavioral problems. These children often must be hospitalized and treated with tapering doses of morphine to prevent withdrawal symptoms and adapt to becoming opioid free. The children also have a risk for lower birth weight.<sup>12</sup>

Opioid misuse during pregnancy can lead to:

- High rates of infection (Hepatitis C and HIV in IV drug users)
- Poor prenatal care
- Increased 1<sup>st</sup> trimester spontaneous abortions
- Increased 3<sup>rd</sup> trimester premature labor (opioid withdrawal)
- Untreated substance abuse in mothers
- Interruption of maternal/fetal dyad
- Low birth weight



## CONTRIBUTING FACTORS

Treating expectant mothers struggling with substance use disorders during pregnancy can be extremely frustrating. The clinic staff may find it difficult to be sympathetic to her needs when her behaviors are putting her unborn child at risk. Understanding the contributing factors of substance use disorders in women may help to address this issue.

### Adverse Childhood Experiences (ACEs)

Adverse childhood experiences are correlated with substance use disorders. The [Early Childhood Health Optimization Module](#) introduced the concept of Adverse Childhood Experiences (ACEs). The relationship between multiple adverse childhood experiences and poor health outcomes in adulthood are well established. Higher ACE scores have a strong relationship to initiation of drug use as well as later substance use disorders. When compared with people with no ACEs, people with five or more ACEs were 7 to 10 times more likely to report illicit drug use, addiction, and intravenous drug use.<sup>13</sup> These studies also show that women have a 50% greater chance of having five or more ACEs than do men.<sup>14</sup> Childhood sexual abuse is strongly associated with drug or alcohol dependence. Women who experienced any type of sexual abuse in childhood were roughly three times more likely than non-abused girls to report drug dependence as adults.<sup>15</sup> For over a decade, researchers have pointed out that as many as 75% to 90% of women in treatment for substance use disorders have a history of sexual abuse or assault.<sup>16</sup>

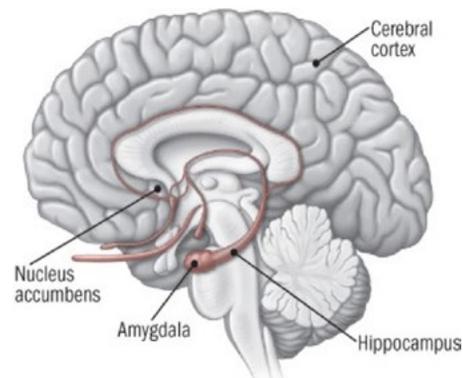
### Genetics

The application of genetic epidemiological studies has consistently demonstrated that genetic factors have a major influence on progression of substance use to dependence; whereas, environmental factors unique to the individual play an important role in exposure and initial use of substances. Studies show that genetics, in combination with environmental factors, account for 40% to 60% of a person's vulnerability of substance use disorders.<sup>17</sup> As with other disorders, the more risk factors that a woman has, the more likely that the genetic impact will manifest itself in a substance use disorder.

### Disease Factors

Scientific research has shown that alcohol and other drugs can change brain structure and function. Brain imaging makes it possible to determine the alterations in the brain's composition. The biological processes that result in these changes have been described by Harvard University in *Overcoming Addiction*.<sup>18</sup>

Positive experiences are recorded in the brain in the same way, regardless of the source—whether it is a good meal or psychoactive drugs. These positive experiences are registered in the brain through the release of the neurotransmitter dopamine in the nucleus accumbens, a cluster of nerve cells lying underneath the cerebral cortex (see illustration).



Drugs, ranging from nicotine to heroin, cause a particularly powerful surge of dopamine in the nucleus accumbens. The likelihood that the use of a drug or participation in a rewarding activity will lead to addiction is directly linked to the speed with which it promotes dopamine release, the intensity of that release, and the reliability of that release. Addiction can be related to the method of administration of the drug. Smoking a drug or injecting it intravenously, as opposed to swallowing it as a pill, for example, generally produces a faster, stronger dopaminergic signal and is more likely to lead to drug abuse.

Alcohol and addictive drugs provide a shortcut to the brain's reward system by flooding the nucleus accumbens

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with dopamine. The hippocampus lays down memories of this rapid sense of satisfaction, and the amygdala creates a conditioned response to certain stimuli. The impact of the dopamine is complicated. Dopamine not only contributes to the experience of pleasure, but also plays a role in learning and memory—two key elements in the transition from stimulating pleasure to addiction.

According to the current theory about addiction, dopamine interacts with another neurotransmitter, glutamate, to take over the brain's system of reward-related conditioning. The reward circuit in the brain includes areas involved with motivation and memory as well as with pleasure. Addictive substances and behaviors stimulate the same circuit—and then overload it. Repeated exposure to an addictive substance can result in nerve cells in the nucleus accumbens and the prefrontal cortex to communicate in a way that pairs enjoyment with wanting to re-experience the substance in turn creating a craving for the substance.



## Gender Differences

Biological attributes unique to women are a factor in substance use disorders. The progression from initiation to dependency is accelerated in women. This phenomenon, known as telescoping, is seen in the use of opioids, cannabis, and alcohol. Thus, when women are identified with a disorder, they often have a severe clinical profile including issues with medical care, psychological issues, and social problems, despite the fact that they may have been using the substance for a relatively short period of time.<sup>19</sup>

Research is showing that neuroactive gonadal steroid hormones may influence the woman's drug experience. Ovarian steroid hormones, metabolites of progesterone, and negative allosteric modulators of the  $\gamma$ -aminobutyric acid A (GABA-A) receptor, such as dehydroepiandrosterone (DHEA), may influence the effects of drugs. Examples of the differential use and effect of various substances on women is shown below.

- **Alcohol** Women tend to use alcohol in response to stress and negative emotions and are slightly more likely to have co-occurring mental health disorders. The alcohol use and tendency to relapse may be compounded by women's different stress reactivity. Among substance dependent women, attenuated neuroendocrine stress response has been shown following exposure to stress and drug cues. This hypothalamic-pituitary-adrenocortical (HPA) dysregulation may be one of the key factors in enhanced vulnerability to relapse. Women may be more adversely affected by alcohol because of the lower percentage of total body water, decreased first pass metabolism because of lower levels of alcohol dehydrogenase in gastric mucosa, and slower rates of alcohol metabolism.
- **Stimulants** Increased use of stimulants in women has been documented. Approximately 24% of pregnant women admitted for federally funded substance abuse treatment centers in 2006 were admitted for methamphetamines. Reinforcing effects of stimulants may be strongly influenced by women's hormonal milieu. Estrogen increases the reinforcing influences of the stimulant while progesterone decreases it. Estrogen and progesterone are increased during pregnancy.
- **Opioids** Prescription drug misuse, especially for opioids has significantly increased over the last decade. Studies show that women may misuse prescription drugs at a higher rate than men. Women are also more likely to use additional drugs such as stimulants and alcohol, benzodiazepines, and nicotine with the opioids. Traditionally, women have been less likely to use heroin, especially intravenously. In fact, heroin abuse by women was usually related to its use by their sexual partner.<sup>20</sup> However, now with more strict drug monitoring programs, opioids are more difficult to obtain and more expensive. Thus, women are using heroin at higher rates than in prior years.



## PARENTING – AN INTERGENERATIONAL ISSUE

The clustering of risk and conditions is common in families with maternal substance abuse. With the possible exception of the toxic impact of prenatal exposure, the co-occurrence of maternal substance abuse with other conditions such as domestic violence and poverty, accounts for most of the negative developmental effects associated with substance abuse.<sup>21</sup> Women with substance use disorders have several challenges in parenting. First, the presence of the disorder makes it very difficult for them to be responsive to the needs of their infant. When there is alcohol abuse in the home, children are more likely to be exposed to other adverse experiences as well, as the figures below show.

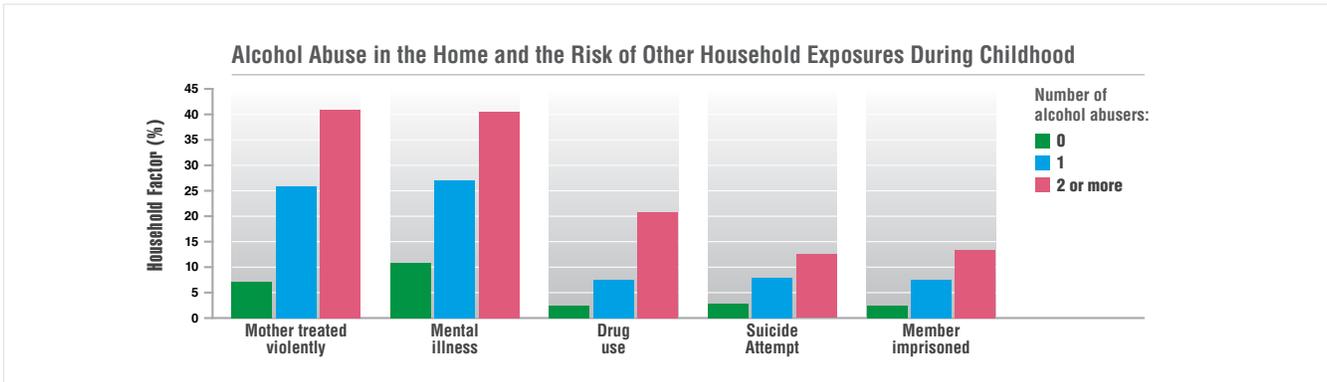
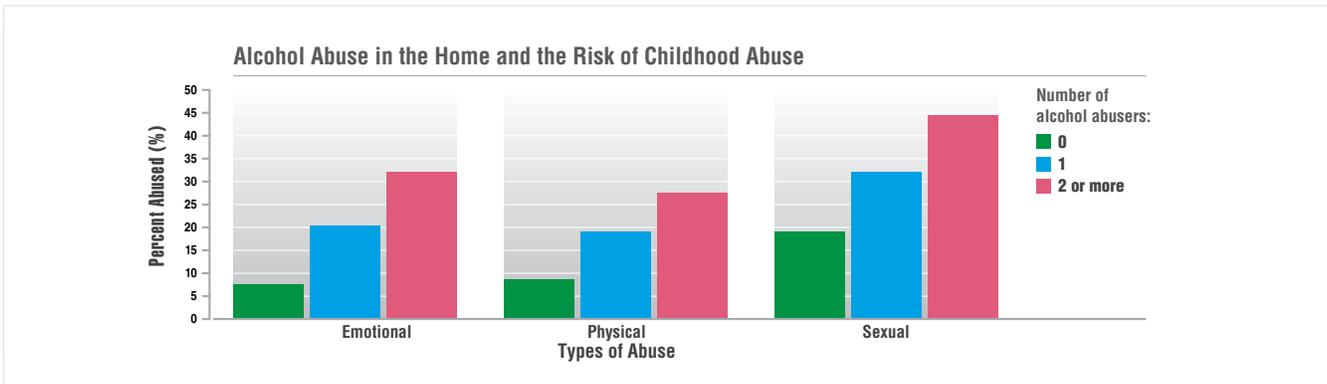
Personality traits such as impulsiveness also impact the use of substances as well as parenting tendencies that contribute to intergenerational transmission. People with a SUD have elevated impulsivity before drug exposure and these indices are strong and reliable indicators of later drug use. These traits become even more pronounced when combined with child maltreatment. Children with a particular serotonin transporter gene (5-HTTLPR) are at

increased risk for early alcohol use, and there is an interaction between having the short allele of this gene and maltreatment. Children with both a maltreatment history **and** this gene are at the greatest risk to initiate alcohol use early in life.<sup>22</sup>

Parents with substance use disorders tend to have the following characteristics:

- Caregiver impulsivity, intrusive and disruptive behaviors.
- Non responsiveness to child’s needs and cues.
- Feelings of guilt and shame.
- Inconsistent parenting—at one time attentive and then others neglectful.<sup>23</sup>

These difficulties may disrupt the child-parent relationship resulting in the young child’s difficulties with self-regulation, aggression, and problems with parent-child attachment. The possibility that the young child has inherited the tendencies toward impulsivity and substance use and is exposed to these negative environmental factors, provides the fertile environment for intergenerational transmission of a substance use disorder.<sup>24</sup>





## TREATMENT IS EFFECTIVE

Because of the multiple factors associated with substance use disorders and the need for on-going monitoring, it is considered a chronic disease and requires continuous management. Like other chronic conditions, addiction can be managed successfully. Treatment enables people to reverse the addiction's potent effects on the brain and behavior and to regain control of their behaviors. The chronic nature of the disease means that relapses are likely, with symptom recurrence rates similar to those for other well-characterized chronic medical illnesses—such as diabetes, hypertension, and asthma. However, a relapse does not mean a recovery failure.<sup>25</sup> Relapses

must be managed in the same fashion as other failures to adhere to treatment compliance. For pregnant and parenting women, treatment is best when it is gender specific and comprehensive—including basic supports and parenting treatments. In some cases medication-assisted treatment may be warranted. For example, medication assisted treatment (MAT) with methadone or Buprenorphine is an effective evidence-based treatment for opioid-dependent pregnant women. When offered with concurrent substance use treatment and group therapy, MAT allows for improved outcomes for mothers and babies.

## SUMMARY

Maternal substance use is a powerful risk factor. Infant development can be impacted through several mechanisms: direct prenatal effects, genetic effects, and cumulative risk factors. Women who abuse substances very likely have a traumatic past combined with genetic and biological factors that can contribute to the brain disease of addiction. Pregnancy is a time when women may be more motivated to address their addictive behaviors as they also are considering what is best

for their fetus. Through empathetic care, obstetricians and their staff can help the expectant mother seek and receive the comprehensive treatment she requires to achieve recovery. Please see companion documents for more information on this subject.

Pregnancy is a time when women may be more motivated to address their addictive behaviors.

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