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Epidemiology of Substance Use in Reproductive-Age Women

R. Kathryn McHugh, Ph.D.^{1,2}, Sara Wigderson, B.A.¹, and Shelly F. Greenfield, M.D., M.P.H.^{1,2}

¹Division of Alcohol and Drug Abuse, McLean Hospital, Belmont, Massachusetts, USA

²Department of Psychiatry, Harvard Medical School, Boston, Massachusetts, USA

Synopsis

A significant number of women of reproductive age in the U.S. use addictive substances. In 2012 more than 50% reported current use of alcohol, 20% used tobacco products, and approximately 13% used other drugs. Among women, use of these substances is associated with a number of significant medical, psychiatric, and social consequences, and the course of illness may progress more rapidly in women than men. The lifetime prevalence of alcohol and drug use disorders in women is 19.5% and 7.1%, respectively. In addition, as most addictive substances cross the placenta and have deleterious effects on fetal development, substance use has additional potential adverse consequences for women of reproductive age who may become pregnant. Specific barriers to accessing effective substance use treatment exist for women. The prevalence of substance use and evidence of accelerated illness progression in women highlight the importance of universal substance use screening in women in primary care settings.

Keywords

substance use; substance use disorders; women; pregnancy

Although the prevalence of use of addictive substances is greater in men than women, this gender gap is steadily narrowing in both the U.S. and internationally.^{1,2} In 2012, of the almost 41.5 million individuals in the U.S. who reported using illicit drugs in the previous year, over 42% were women.³ Women represented over 40% of users of tobacco products (33 million women) and almost 50% of alcohol users (85.5 million women).³ During this same time, over 7.6 million women ages 12 and older in the U.S. were estimated to suffer from a substance use disorder.³

An increase in research on substance use in women in recent years has found that women may be more susceptible to the medical, psychiatric, and social consequences of addictive

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Corresponding Author: Shelly F. Greenfield, M.D., M.P.H., McLean Hospital, Proctor House 3, MS 222, 115 Mill Street, Belmont, MA 02478, Phone: 617-855-2241, Fax: 617-855-2699, sgreenfield@mclean.harvard.edu.

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substances than men. Relative to men, women exhibit a shorter latency from the initiation of substance use to the onset and progression of substance use disorders (a "telescoping" course of illness).^{4,5} Moreover, when women present to treatment for substance use disorders, they often report greater impairment relative to men in employment, social, psychiatric, and medical domains.^{6,7} Women with substance use disorders also disproportionately suffer from cooccurring anxiety and depressive disorders,^{4,8} and may be more likely to use substances to manage negative affect.^{7,9} In pregnant women, substance use is a particular concern for the health of the developing fetus due to the teratogenic effects of a number of addictive substances,¹⁰ as well as negative effects on fetal development via poor maternal health and health behaviors (e.g., nutrition).¹¹

This article will provide a brief overview of the epidemiology of alcohol, nicotine, and illicit substance use in women of reproductive age including the prevalence, medical consequences, and treatment considerations. See Table 1 for a list of key definitions.

Alcohol Use

Prevalence and Course

In 2012, 47.9% of American women ages 12 years and over reported that they were current alcohol users.¹² Among women ages 14–44 who were not pregnant, 55.5% reported alcohol use, 24.7% reported binge drinking, and 5.2% reported binge drinking on at least 5 days in the past month.¹² These prevalence estimates utilize definitions of binge drinking established by the Substance Abuse and Mental Health Services Administration;¹² however, these likely are underestimates because these definitions rely on a higher threshold for women than the widely accepted definitions used by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) (see Table 1). The prevalence of alcohol use disorders in women is approximately 4.9% in the past year and 19.5% lifetime.¹²

Alcohol use typically is initiated in late adolescence and problematic use is most prevalent in young adulthood for both men and women. The majority (over 80%) of individuals first using alcohol in 2012 were younger than 21, and over 58% were under age 18, with similar numbers of initiators among men and women.³ In addition to the overall rise in alcohol use in young women, binge drinking among young women has increased; 33.2% of women ages 18–25 reported binge drinking in the previous year.³ Currently one out of every eight U.S. women (nearly 14 million) binge drinks approximately 3 times each month with an average of 6 drinks per binge. The increase in binge drinking in young women prompted an alert from the Center for Disease Control in January, 2013 stating that binge drinking is a serious, under-recognized problem among women and girls.¹³

Medical Consequences

Alcohol-related medical complications are the 8th leading cause of death worldwide.¹⁴ The NIAAA defines "low-risk" drinking for men as no more than 4 standard drinks in a day and no more than 14 drinks per week. For women, low risk drinking is defined as no more than 3 standard drinks in a day and no more than 7 standard drinks per week.¹⁵ A standard drink is the equivalent of a 12 oz. beer, a 5 oz glass of wine, or 1.5 oz of liquor. Heavy drinking in women is associated with greater mortality and shorter lifespan.^{16,17} In addition to risks

related to injury, heavy alcohol use has a wide range of negative effects on health, such as adverse effects on cognitive and immune functioning, and increased risk for hypertension, cardiovascular and gastrointestinal disease, and the development of certain cancers including breast, mouth, and throat cancer.¹⁸ Binge drinking is also associated with injuries and risky behaviors,¹⁹ and greater susceptibility to sexual victimization and violence.^{20,21} Additionally, binge drinking is associated with unintended pregnancy and sexually transmitted diseases, such as HIV.^{19,22}

Pregnant Women

Although the prevalence of alcohol use in pregnant women is lower than among non-pregnant women, among pregnant women ages 14–44, 8.5% reported alcohol use, 2.7% reported binge drinking, and 0.3% reported binge drinking on at least 5 days out of 30 during pregnancy in 2012.¹² Among pregnant women ages 18–50, 3.6% met diagnostic criteria for an alcohol use disorder.²³

Alcohol crosses the placenta and is a well-established teratogen.²⁴ Fetal Alcohol Spectrum Disorders (FASDs), conditions associated with irreversible birth defects, are among the most concerning potential consequences of alcohol use in pregnancy. The most severe disorder within this spectrum is Fetal Alcohol Syndrome, which includes mental and physical defects, such as abnormal facial features, growth deficits, and problems with the central nervous system.²⁵ Other FASDs are characterized by a range of problems, such as deficits in intellect and learning, and damage to organs and physical features.²⁶ The overall prevalence of FASDs is estimated to be approximately 2–5% of births.²⁷

Although low levels of drinking during pregnancy have not been associated with growth abnormalities,²⁸ even low levels of use have been associated with behavioral problems.²⁹ Research in animals suggests that even light to moderate alcohol exposure throughout gestation has negative effects on development.^{30,31} A number of imaging studies in humans have demonstrated that prenatal alcohol exposure disrupts development of both gray and white matter and illustrate alcohol-related alterations in cerebral blood flow, neurotransmitters, and neuronal activity; individuals with prenatal alcohol exposure can exhibit neuronal anomalies and dysfunction without distinct facial dysmorphism.³² Given the range of adverse alcohol effects on fetal development demonstrated by current research, the U.S. Surgeon General has recommended that women abstain from alcohol consumption during pregnancy.³³

The effect of alcohol use on breastfeeding infants has been less well studied; however, studies suggest that a small percentage of alcohol consumed is absorbed in breast milk and passed to the infant during breastfeeding.³⁴ Alcohol use has been shown to inhibit lactation and result in modified feeding patterns by the infant^{35,36} as well as other potential adverse effects on gross motor development and early learning.³⁵ Other research on the effects of alcohol exposure during breastfeeding on the infant has yielded inconsistent findings.³⁷ However, it is important to note that alcohol inhibits lactation and no safe levels of alcohol consumption while breast feeding have been established with regard to transmission to the infant.

Nicotine Use

Prevalence and Course

Despite steady decreases in tobacco product use in the U.S. over the past 10 years, use remains high. In 2012, 20.9% of women age 12 and older reported use of tobacco products. During this time, the female to male ratio was 1 to 1.6, and almost equivalent among female and male adolescents (6.3% vs. 6.8%).¹² Cigarette smoking remains the most common method of tobacco use, and the majority (over 60%) of cigarette smokers are daily smokers, with over 40% smoking a pack or more per day.¹²

Tobacco use often is initiated during adolescence. In 2012, over 50% of first-time smokers were under the age of 18.¹² The likelihood of transitioning from use to dependence is exceptionally high for nicotine, with estimates that over 67% of nicotine users will develop nicotine dependence at some time during their life.³⁸ Although a number of risk factors have been identified for smoking in both genders, such as parent and peer smoking and low socioeconomic status, women may be disproportionately affected by weight and affect-related risk factors. Adolescent women who report weight and diet-related concerns appear to escalate to regular smoking more quickly than those who do not,³⁹ and women report post-cessation weight gain as a barrier to quitting more commonly than men.⁴⁰ Women also report higher distress and urges to smoke in response to negative affective states.⁹ Timing of quit attempts with menstrual cycle phase may also be important for women, as there is some evidence that women achieve greater success rates when smoking cessation efforts are timed in the follicular rather than the luteal phase of the menstrual cycle.⁴¹

Medical Consequences

Smoking is the leading preventable cause of death in the U.S.,⁴² and the 2nd leading cause of mortality worldwide.¹⁴ Cigarette smoking has a number of significant health consequences for women, such as morbidity and mortality associated with cardiovascular disease,⁴³ respiratory disease,⁴⁴ and a range of cancers including lung, throat, breast, and ovarian cancer.^{45–49}

Despite some evidence that women are more susceptible to the carcinogenic effects of cigarette smoking than men, a number of large studies have suggested that the incidence of lung cancer among smokers is equivalent between men and women.⁴⁵ Lung cancer is the second most common cancer in women and the leading cause of cancer death in women.⁵⁰ Smoking has been estimated to cause 80% of lung cancer deaths in women, and smokers are 15–30 times more likely to develop lung cancer relative to non-smokers.⁵⁰ Heavy, long-term smoking appears to increase the risk for breast cancer⁴⁸ and doubles the risk of developing ovarian cancer.⁴⁹

Pregnant Women

In a 2012 study, 15.9% of pregnant women between the ages of 15–44 reporting smoking cigarettes in the previous month.¹² Importantly, although the prevalence of cigarette smoking in non-pregnant women in this age group has decreased in the past 10 years, the prevalence of cigarette smoking in pregnant women has remained relatively stable.¹²

Women with greater severity of nicotine dependence, a partner who also smokes, and greater socioeconomic stress may have greater difficulty with abstaining from smoking during pregnancy.⁵¹

The teratogenic effects of smoking have been widely documented. Nicotine, as well as a number of other harmful compounds in cigarette smoke, cross the placenta and have wide-ranging negative effects on fetal development. Smoking during pregnancy has been associated with low birth weight, being small for gestational age, and preterm birth,^{52,53} as well as long-term effects on cognition.⁵⁴ Smoking cessation can lead to significant reductions in these health risks for both women⁵⁵ and the developing child (particularly quitting in the first trimester).⁵⁶

Illicit Drug Use and Non-Medical Prescription Drug Use

Prevalence and Course

The gaps between men and women in prevalence remain highest for illicit drugs relative to other addictive substances.¹² However, women and men exhibit a similar prevalence of non-medical prescription drug use and prescription drug use disorders,^{57,58} and the prevalence of these problems (particularly with opioid analgesics) has increased rapidly over the past 15 years.⁵⁹ Approximately 13% of women in the U.S. use illicit drugs or non-prescribed drugs each year and over 43% will engage in drug use in their lifetime.³

Marijuana is the most commonly used illicit drug among both men and women (38.1% of women age 12 and older report lifetime use of marijuana), followed by nonmedical use of prescription medications (18.9%), cocaine and hallucinogens (approximately 11% each), inhalants (5.3%), and heroin (1.0%).³

Although many women who use illicit or non-prescribed drugs will not develop substance use disorders, it is estimated that approximately 8–9% of marijuana users will develop marijuana dependence in their lifetime,³⁸ and 5–6% of first-time cocaine users will develop cocaine dependence within a year (up to 16% within 10 years).⁶⁰ Non-medical prescription drug use is associated with later development of a substance use disorders, particularly among younger users.⁶¹ Approximately 1.2% of women meet criteria for a drug use disorder in the past year and 7.1% over the course of their lifetime.⁶² Including both men and women, the prevalence of illicit drug use disorders is highest among those ages 18–25 (7.8%) relative to those under 18 (4%) and those 26 and older (1.8%).³

Medical Consequences

The use of illicit substances and nonmedical use of prescription drugs are associated with a myriad of significant health consequences, such as negative effects on cognition, increased risk for infectious disease, respiratory and cardiovascular illnesses, and accidental overdose.

Although it has been far less studied than tobacco, marijuana smoking (particularly heavy use) appears to be associated with respiratory illness, such as impairment of airway function⁶³ and risk for lung cancer.⁶⁴ Moreover, many marijuana users also are regular users of nicotine, and the use of both substances may confer particularly elevated risk for

respiratory illness, such as chronic obstructive pulmonary disease.⁶⁵ Marijuana use—particularly beginning in early adolescence—may have significant negative effects on cognition, such as lower intelligence and greater impulsivity.^{66,67} In addition to these adverse medical consequences, a prospective longitudinal study demonstrated that marijuana use in adolescence, especially use before age 15, conferred an elevated risk for developing schizophrenia in adulthood.⁶⁸

Cocaine use has significant medical consequences and is associated with more emergency room visits than any other addictive drug.⁶⁹ Cocaine is associated with substantial cardiovascular risks, such as myocardial infarction, cardiac arrhythmias, and hypertension,⁷⁰ as well as deleterious effects on the pulmonary and central nervous systems.^{71,72} Research has identified a number of gender differences in behavioral and neurobehavioral responses to cocaine, which may be mediated by gonadal hormones.⁷³

Opioids also are associated with a number of medical consequences, such as accidental overdose and risks associated with intravenous drug administration. Among the most concerning risks are infectious diseases associated with shared injection equipment, such as HIV and hepatitis C. Women with substance use disorders may be more susceptible to risky injection behaviors and risky sexual behaviors.^{74,75} Accidental overdose deaths from prescription opioids increased dramatically in the U.S. in the 2000s and has the highest mortality prevalence, followed by cocaine, sedative hypnotics, and heroin.⁷⁶

Pregnant Women

Estimates of illicit drug use among pregnant women suggest that the annual prevalence of use (approximately 6%) is lower than that of non-pregnant women.¹² Prevalence is highest among young pregnant women (18.3% among women age 15–17 and 3.4% among those 26–44).¹² Approximately 1.6% of pregnant women meet criteria for a drug use disorder.²³ Marijuana and cocaine appear to be the most commonly used illicit drugs among pregnant women;⁷⁷ however, in certain geographic areas (e.g., the Western U.S.), methamphetamine use is a significant problem among pregnant women and is a common reason for seeking substance abuse treatment.⁷⁸

Addictive illicit and prescription drugs are associated with a number of negative effects on fetal development. For example exposure to marijuana,⁷⁹ cocaine,⁸⁰ and opioids⁸¹ have been associated with growth restriction and low birth weight, poor neonatal outcomes,⁸² and long-term negative effects on cognitive and academic performance in children.⁸³ Opioid use during pregnancy is associated with neonatal abstinence syndrome, a withdrawal syndrome that has been increasing in prevalence.⁸⁴

A criticism of the relatively limited research on the effects of use of illicit drugs during pregnancy is that many studies have failed to adequately control for related factors that may contribute to poor outcomes, such as poverty, poor nutrition and chronic stress. For example, prenatal cocaine exposure gained significant media attention in the 1980s due to the purported “crack baby” epidemic. Although use of cocaine during pregnancy is associated with a number of negative outcomes, many early reports of the severity of these effects were likely overstated. Recent studies controlling for other variables, such as poverty, have

suggested that the cocaine-exposed children exhibit similar outcomes to those not exposed to cocaine—particularly when provided with early enrichment interventions.^{85,86} Nonetheless, numerous studies suggest direct or indirect effects (e.g., risk behaviors, poor maternal health) of illicit substance use on fetal development and outcomes, highlighting the importance of treatment in this population.

Clinical Implications: Treatment and Prevention

Given the high prevalence of substance use in women, screening is critical to the early identification of problematic use as well as substance use disorders. Screening and brief interventions implemented in primary care settings including general medicine, obstetrics and gynecologic services, and pediatric and adolescent medicine practices are effective for reducing problem-use among women (including pregnant women).^{87,88} Although there are a number of effective treatments for substance use disorders, less than 20% of women who need treatment receive it in a given year,⁸⁹ and women are less likely than men to engage in substance use disorder treatment.^{57,90} This discrepancy may be attributable to barriers that disproportionately affect women, such as economic barriers, social stigma, co-occurring psychiatric disorders, and lack of child care.⁹⁰ Nonetheless, once in treatment, women and men have similar rates of treatment response.^{7,91}

Among pregnant women, perception of risk appears to be an important predictor of use,^{92,93} highlighting the importance of education on the risks of substance use during pregnancy. Nonetheless, some women will have difficulty discontinuing substance use during pregnancy, such as those with substance use disorders. As treatment has been shown to improve the likelihood of quitting^{87,94} and earlier discontinuation of substance use may decrease some risks to the woman and the developing fetus,⁵⁶ adequate screening and referral to services can be of particular benefit.

For pregnant women with more severe substance use disorders for which pharmacotherapy may be indicated, the balance between risk and benefit must be considered. Although opioid agonist therapies, such as methadone maintenance or buprenorphine maintenance therapy continue to expose the fetus to the drug, the benefits of engaging in these therapies substantially outweigh the risks associated with continued illicit opioid use (e.g., injection use, exposure to higher levels of drug, overdose risk), and provide significant advantage due to the association with better prenatal care, and maternal and neonatal outcomes.^{95–97}

Summary and Conclusions

The use of alcohol, nicotine, and illicit and prescribed drugs is prevalent among women of reproductive age. Problem-level use of these substances is associated with a number of significant health consequences, and women may be particularly susceptible to a rapid progression from initial use of substances, to substance use disorders, to substantial impairment related to these disorders. Substance use disorders are common among women over the lifetime; however, women are less likely to receive substance use disorder care than men.

Substance use in pregnancy is a significant concern given the adverse health consequences for both the mother and the developing fetus. However, the prevalence of substance use among pregnant women continues to be of clinical and public health concern, with more than 1 in 10 pregnant women reporting alcohol or nicotine use, and 1 in 20 reporting other drug use, despite guidance from major groups such as the U.S. Surgeon General and the American Academy of Pediatrics urging abstinence from addictive substances during pregnancy. The evaluation of alcohol, nicotine, and other drug use in reproductive age women is critically important to identify harmful and hazardous use, and to provide women with information on the risks of use, and brief interventions or referrals to substance use treatment as clinically indicated.

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Key Points

- Gender differences in the prevalence of substance use are declining, with women comprising a growing percentage of those who use addictive substances.
- Alcohol, nicotine, and drug use is common in women of reproductive age and problem-level use of addictive substances is associated with a number of medical, psychiatric, and social consequences.
- The high prevalence of substance use in pregnant women highlights the importance of improving public education on the risks of substance use in pregnancy, increasing preventive services, and providing addiction treatment for those pregnant women in need.

Table 1**Key Definitions**

<i>Substance use</i>	The consumption of any psychoactive substance, including alcohol, nicotine, and illicit drugs, and non-medical use of prescription drugs.
<i>Substance use disorder</i>	A pattern of use of an addictive substance that is associated with significant impairment and/or distress as indicated by symptoms such as, disruption of important life obligations, the inability to reduce use, and physiological tolerance for the substance. The prevalence estimates reported in this article correspond to the diagnoses of substance abuse (requiring 1 of 4 symptoms) and substance dependence (requiring 3 of 7 symptoms) as defined by the <i>Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV)</i> . The recently published <i>DSM-5</i> collapses these into a single disorder and includes minor modifications to the list of possible symptoms (requiring 2 of 11 symptoms), and thus these prevalence estimates will likely change as studies begin to utilize this new classification system.
<i>Binge drinking</i>	A pattern of alcohol consumption that brings the blood alcohol concentration (BAC) level to 0.08% or more. This pattern of drinking usually corresponds to 5 or more drinks on a single occasion for men or 4 or more drinks on a single occasion for women, generally within about 2 hours.
<i>Heavy or "At-Risk" Drinking</i>	For women: More than 3 drinks on any single day or more than 7 drinks per week. For men: More than 4 drinks on any single day or more than 14 drinks per week.
<i>Non-medical prescription drug use</i>	Use of a prescribed medication either at a higher dose or greater frequency than prescribed, or use of medication without a prescription.

Data from Refs^{98–101}