A Review of Psychosocial Factors on Birth Outcomes in Women with Substance Use Disorder in the United States: The Importance of Preventing Relapse During Sustained Remission

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Abstract

Infant mortality rate has been an area of concern for the United States for years. Many attributing factors, including psychosocial influences, have been identified. Pregnant patients with substance use disorder have also been shown to experience poor birth outcomes. This study examines trends related to socioeconomic hurdles and mental health in pregnant women with substance use disorder. Databases were searched to find resources that outlined these relationships. After assessing the study designs and associations of fifty-five resources, several patterns were observed, including an increased risk of adverse birth outcomes with higher maternal stress and lower socioeconomic status. In pregnant women with substance use disorder, post-traumatic stress and social stigma resulted in negative effects on mental health. Substance use-related pregnancy anxiety was amplified by triggers that resulted in feelings of fetal detachment and substance cravings. Most literature focused on pregnant patients with active addiction; however, these triggers may have an especially powerful effect on women who become pregnant while in substance use recovery. Studies on remission trajectories indicated a higher mortality risk in people with a history of substance use but have not yet calculated the proportion of women capable of bearing children in this category. This highlights the necessity to develop personalized treatment for pregnant women in sustained remission from substance use disorder to prevent relapse during this crucial time. This population would benefit from a screening tool that assesses for high-risk events like PTSD, psychological stress, and substance use triggers and intervention that includes evidence-based mental health resources.

Introduction

Infant mortality rate (IMR), defined as the number of deaths in infants under one year of age per 1,000 live births, has been a continuous area of concern for the United States (U.S.).[1] The U.S. has an IMR of 5.4, measuring poorly among other developed countries, and has fallen in rank from 6th in the world to 26th in the past 50 years.[2] Previous research has focused on the relationship between IMR and high preterm birth rate, of which a high prevalence of death and disability have been observed. Broader influences of infant mortality have also been identified, such as psychosocial factors like maternal anxiety and socioeconomic status (SES). A positive correlation between maternal stress and adverse birth outcomes has been described, as well as a negative correlation between SES and adverse birth outcomes.[3,4]

One group that is uniquely affected by both socioeconomic and mental health barriers is those with substance use disorder (SUD). In the context of infant mortality, it has been well-documented that this disorder causes an increased likelihood of adverse birth outcomes such as preterm delivery, growth restriction, spontaneous miscarriage, and infant death.[5] Low SES and mental health are often examined as distal foundations to the proximal behavior of substance use when an outcome such as infant morbidity is measured. Further, as these characteristics also affect birth outcomes independently, they are often regarded as confounding variables when studying their effect on substance-related birth adversities.[6] However, there are instances in which psychosocial factors may have a more direct influence on birth outcomes, such as women who struggle with substance use and develop mental health struggles specific to pregnancy.[5] This effect could be especially robust for those who are in an ongoing recovery from SUD and not in a treatment program, a population that has not been considered in the reviewed literature. These women have maintained abstinence long after assisted treatment, forming a group often overlooked in studies of pregnant women with current substance use disorder and those without the disorder. In one study taking place 13 years after substance abuse treatment, 37% of all women participants were in stable remission, defined as over 5 years in recovery.[7,8] The authors also found that patients in the stable remission group, both male and female, had lower overall survival rates than patients who had not struggled with substance use, underscoring the importance of maintaining personalized healthcare following substance abuse treatment. This may be especially important for pregnant women in recovery, as many psychosocial factors may

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increase the risk of stress, limited healthcare access, and relapse-all circumstances that have been associated with negative birth outcomes and IMR.

The social determinants of health must be explored in recovering women who become pregnant to understand the distinct set of obstacles this group faces. Such determinants can include financial stability, education, healthcare quality, and community support. This group may encounter specific obstacles such as pregnancy-related anxiety and post-traumatic stress disorder (PTSD) triggers.[5] Many of these factors are preexisting susceptibilities that precipitate due to the pregnancy itself or prenatal care.[4] As such, the mediating effect of these susceptibilities that may have surfaced from a history of substance use should be considered in future studies and their effect analyzed through multivariable analyses. Additionally, where a relationship can be demonstrated, a potential for intervention exists.

Based on important psychosocial factors, pregnant patients at risk of relapse could be screened and provided with appropriate resources to help prevent relapse. Screening tools are a quick and efficient way to evaluate the degree of risk associated with a healthcare outcome. In substance abuse patients, the implementation of Screening, Brief Intervention, and Referral to Treatment (SBIRT) has been proven effective by numerous randomized controlled trials.[9] Reductions in substance use were shown to be attributable to the screening techniques alone. Suggested treatment may include therapies like Motivational Enhancement Therapy (MET) and Cognitive Behavioral Therapy (CBT). Aside from improving the well-being of patients and communities, providing connections to necessary services helps prevent the costly sequelae of relapse for both the patient and healthcare organizations. SBIRT is a billable service and its sustainability can be used as an example of how valuable this type of screening and intervention can be.[10] Screening for at-risk pregnant women in remission from SUD would be a focused transition from the successful tools that are already in use.

This narrative review of literature serves to discuss the associations that have been previously outlined between psychosocial factors like mental health and socioeconomic class on both substance use and adverse birth outcomes and use these relationships to answer the question "Are pregnant women in stable recovery uniquely affected by psychosocial factors?". It can be hypothesized that this is a special group where these factors intersect and that evidence-based interventions may help reduce anxiety and relapse, ultimately improving birth outcomes. Guidance is provided for future studies as well as examples of how these interventions may be applied.

Methods
Search Strategy & Selection Criteria
We included studies that describe a relationship between two or more of the following factors: socioeconomic status, mental health, substance use disorder, and pregnancy. Electronic databases were searched during August, September, and December of 2022, and August of 2023 with the assistance of a university librarian. These databases include EBSCOhost, PubMed, Scopus, and Wiley Journals. Searches included terms such as 'history of substance abuse and birth outcomes', 'socioeconomic status and mental health on infant mortality rate', and 'pregnancy anxiety and substance use disorder'. U.S. government electronic resources such as the National Institute of Health, National Institute on Drug Abuse, the Organisation for Economic Co-operation and Development (U.S. department), and the U.S. Department of Health and Human Services were also consulted. The search terms were selected to find resources that summarized well-known effects of substance use and psychosocial factors on adverse birth outcomes. Each source was analyzed by study design, sample population, sample size, and statistical significance of the association described. By condensing these previously shown relationships and evaluating the populations affected, the research hypothesis was addressed by identifying a lack of literature describing psychosocial factors that impact pregnant women in substance use recovery. As a narrative review, the synthesis of the included studies was descriptive, and the data may have varying qualities. There is no assumption that the evidence of research is exhaustive, which is a limitation of this search strategy.

Inclusion & Exclusion Criteria
The included studies had to demonstrate a relationship between either mental health and pregnancy, SES and substance use, substance use and pregnancy, or a well-described combination of any of these factors. The population studied had to be adults and sampled from the United States. Modifying circumstances that were irrelevant to the parameters of the research question had to be absent or minimal. Types of studies included were systematic reviews, meta-analyses, randomized controlled trials, prospective and retrospective cohorts, cross-sectional studies, and government databases. After thorough screening and removal of duplicates, 66 resources were originally extracted for full review.

Exclusions were made due to studies having an inapplicable population (n = 3), taking place in a country other than the United States (n = 5), and having any other modifying factors that deemed the study irrelevant to this review's research question (n = 3). Such exclusions were made due to child and adolescent populations, studies performed in the context of the COVID-19 pandemic, and study countries such as Kenya, Austria, and Canada. Types of studies excluded were abstracts, news articles, webpage articles, editorials, and encyclopedias. Fifty-five resources were used for the final review. A summary of the population, sample size, and study design for each resource can be found in _Table 1_.

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Table 1. **Characteristics of Studies with Relationships between Substance Use, Pregnancy, Mental Health, and Socioeconomic Status.**

Study	Population	Sample Size	Study Design
Asta et al. 2021	Pregnant women with OUD at a large academic women's hospital in Pennsylvania	50	Cross-sectional
Brogly et al. 2018	Pregnant women in treatment program where methadone and buprenorphine were administered	113	Prospective cohort
Buczkowski et al. 2020	Parents of infants admitted to NICU with neonatal withdrawal syndrome in Northern New England	15	Cross-sectional
Burris et al, 2017	Pregnancies from 2005-2009 in US birth certificate database	36,637	Retrospective cohort
Comfort et al, 1999	Pregnant women who were cocaine dependent enrolled in residential and outpatient treatment settings	Residential=32 Outpatient=32	Prospective cohort
Dunkel Schetter et al, 2012	Pregnancies documented in an HMO covering a public clinic and private suites of a metropolitan hospital	418	Prospective cohort
Fallin-Bennett et al, 2020	Postpartum women in an outpatient opioid use disorder clinic who had interacted with a peer support specialist at any time during pregnancy or postpartum	9	Cross-sectional
Fishman et al. 2020	National Center for Health Statistics linked birth and death data from 2007-2010	7,215,833	Retrospective cohort
Forray et al. 2015	Pregnant participants in a Psychological Research to Improve Drug Treatment in Pregnancy trial	152	RCT
Hargraves et al. 2017	Ten primary care practices within the Greater Cincinnati area	21,635	Cross-sectional
Havens et al, 2009	Women who participated in the 2002 or 2003 NSDUH	Pregnant=1800 Non-pregnant=37,527	Cross-sectional
Joshi et al. 2021	Pregnant women in the United States who used medication for OUD	3193 women	Meta-analysis
Kelley et al. 2021	Standardized patients making appointments for pregnant White and American Indian women with OUD at primary care and OB/GYN clinics in three rural Utah counties	34 calls to 17 clinics	Cross-sectional
Kelly et al, 2018	US adults who answered yes to the question: "Did you used to have a problem with alcohol or drugs but no longer do?"	2,002	Cross-sectional
Kline-Simon et al. 2017	Adults entering a substance use treatment program between 1994-1996 and adults without substance use disorder with similar demographics	997 with SUD, 4241 without	Prospective cohort
Knittel et al. 2022	Pregnant women with OUD in a women's prison in Southeastern United States	279	Retrospective cohort
Lewis et al. 2018	Adults in residential substance use treatment programs in Northern Florida from 2006-2015	945	Retrospective cohort
Madras et al. 2008	Patients who screened positive for substance use disorder using SBIRT across six states	104,329	Prospective cohort
McCarron et al. 2018	Women in a pregnant & postpartum substance use treatment program in the Northern Plains	18	Cross-sectional
Miele et al. 2023	Health record data from pregnant women with OUD who received buprenorphine, methadone, or naltrexone	5541	Retrospective cohort
Najavits et al. 1998	Women who reported substance use in the past 30 days and met the DSM-IV criteria for substance dependence and PTSD	17	Prospective cohort
Osterman et al, 2017	Pregnant women entering treatment for SUD in North Carolina, New Mexico, Kentucky, and Indiana	200	RCT
Rosenthal et al. 2021	Pregnant women who used methadone during pregnancy at a treatment center from 2012-2017	339	Retrospective cohort
Saloner et al, 2013	Patients who were discharged from publicly funded SUD facilities in 44 states, D.C., and Puerto Rico, 2007	1,026,332	Retrospective cohort
SAMHSA NSDUH	Residents of households and people in non-institutional group settings in 50 states plus D.C. in 2021	67,500	Cross-sectional
Sanjuan et al. 2019	Pregnant women with SUD and prior trauma enrolled in a treatment program at a public sector hospital in Southwest US	32	Prospective cohort
Schempf et al, 2008	Low-income women who delivered an infant at John Hopkins Hospital from 1995-1996	808	Retrospective cohort
Schiff et al. 2014	Women with OUD who had a live birth in Massachusetts between 2012-2014	4154	Retrospective cohort
Schmidt et al. 2023	Women in opiate treatment programs and homeless shelters in San Francisco and healthcare providers with reproductive health and SUD services	28 women, 26 providers	Cross-sectional
Stone, 2015	Pregnant women in a Midwestern city who had used substances during pregnancy	50	Cross-sectional
Suntai, 2021	2017 Treatment Episode Data-Discharges from SAMHSA	13,382	Retrospective cohort
Terplan, et al, 2012	Data from the NSDUH over a 5-year time frame	>140,000	Retrospective cohort
Travers et al. 2020	Infants born from 2007-2013 in 50 states plus D.C. using CDC WONDER linked birth and death data	28,526,534	Retrospective cohort
Trost et al. 2021	Pregnancy-related deaths from 2008-2017 reported by MMRCs of 14 states	421	Retrospective cohort
Tyson, et al, 2022	Emergency department visits by pregnant women in US from 2016-2019	2057	Cross-sectional
Verissimo et al, 2017	Civilian non-institutionalized adults living in the United States	532	Longitudinal survey
Vrana-Diaz et al. 2017	Women enrolled in an intensive community SUD treatment program	80	RCT
Walsh et al. 2019	Pregnant patients 18-45 years old in 1st or 2nd trimester at Columbia University Medical Center from 2011-16	187	Prospective cohort
Walton-Moss et al. 2009	Pregnant women in a university-associated hospital SUD treatment program in the US	84	Prospective cohort
Witte et al, 2023	Individuals in remission from moderate or severe substance use disorder in the US	494	Cross-sectional
Xu et al. 2014	Pregnant women with SUD	82	RCT
Yonkers et al. 2012	Pregnant women at two reproductive-health clinics in New Haven and Bridgeport, Connecticut who had used a substance in the last 28 days and were not already enrolled in SUD treatment	168	RCT
Zedler et al. 2016	Pregnant women with OUD who used buprenorphine or methadone for treatment	2146 studies	Meta-analysis

Legend: * NICU: Neonatal Intensive Care Unit; OUD: Opioid Use Disorder; US: United States; HMO: Health Maintenance Organization; SAMHSA NSDUH: Substance Abuse and Mental Health Services Administration National Survey on Drug Use and Health; OB/GYN: Obstetrics and Gynecology; SBIRT: Screening, Brief Intervention, and Referral to Treatment; DSM-IV: The Diagnostic and Statistical Manual of Mental Disorders IV; PTSD: Post-Traumatic Stress Disorder; SUD: Substance Use Disorder; D.C.: District of Columbia; CDC WONDER: Center for Disease Control & Prevention Wide-ranging Online Data for Epidemiological Research; MMRC: Maternal Mortality Review Committee. RCT: Randomized controlled trial.

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Results

Theme 1: Mental Health & Socioeconomic Status

Many psychosocial factors affect birth outcomes, including maternal stress and anxiety, as well as socioeconomic status.[11] An estimated 30% of women have reported psychosocial stress in their daily lives during pregnancy and the rate of depressive disorders reported at birth has increased from 4.1 per 1,000 births to 28.7 from 2000-2015.[12,13] Dunkel Schetter and Tanner identified stressors that were associated with a high level of impact, including lack of material resources, poor workplace environment, excessive household responsibilities, and intimate relationship strain.[14] The measured depressive symptoms exhibited a linear relationship with adverse birth outcomes like low birth weight ($p<0.05$). Interestingly, perceived stress and daily troubles did not have a significant effect on any birth outcome ($p=0.27$, $p=0.59$) but stressors of a more chronic nature, such as racism and discrimination, demonstrated a robust effect on birth weight ($p<0.01$). This study was well-controlled for confounders such as smoking, education, income, and medical risks.

Walsh et al. described maternal stressors that resulted in clinically meaningful depression and anxiety phenotypes in the mother that could be measured physiologically.[13] These phenotypes were measured by quantifiable increases in allostatic load as well as increased fetal heart rate reactivity to stimuli. The allostatic load is defined as a cumulation of physiological stress indicators including blood pressure, heart rate, immune markers, and cortisol levels. Women who exhibited a higher allostatic load during the antenatal period had an increased risk of delivering both a preterm (OR=1.44, 95% CI=1.02-2.08) and low birth weight infant (OR=1.39, 95% CI=0.99-1.97). This study also included a psychologically stressed group that demonstrated high levels of depression and anxiety as well as daily negative mood and PTSD. The psychologically stressed group was significantly more likely to present with pregnancy complications ($p<0.05$) and reported higher instances of childhood trauma like abuse and neglect, as well as fewer years of education, lower income, and an increased likelihood of receiving public assistance. Among the greatest differentiators between tested groups, the most influential factor was social support. Lack of community support decreased hypothalamic-pituitary-adrenal axis regulation and magnified proinflammatory processes ($p<0.001$), which resulted in adverse birth outcomes and maternal depression throughout the perinatal period. The sample sizes for these groups were small, with a lack of representation for several ethnic minority groups, and the number of fetal neurodevelopment assessments were even smaller. As such, these results must be considered with caution.

Depression can reach severe enough levels in some patients to result in emergency room (ER) admission. Tyson et al. examined this trend, observing that mental health complaints comprised 6.2% of all ER admissions during pregnancy in their sample.[15] Women who experienced antenatal depression were more likely to deliver a preterm infant as well as have their infant admitted to the neonatal intensive care unit (OR=1.24, 95% CI=1.14-1.35). In some cases, mental health disorders in pregnant patients can result in maternal death, reported in one sample as nearly 11% of all pregnancy-related deaths.[12]

Anxiety surrounding the pregnancy itself is especially consequential, as explored in one study.[14] The authors demonstrated the effects of 'pregnancy anxiety,' a term described as a definable syndrome that presents as fear surrounding both childbirth and the postnatal period, as well as the well-being of themselves and the fetus, prenatal care, and transitioning into a maternal role. After controlling for risks, pregnancy anxiety was the only significant indicator of preterm birth when evaluating it alongside perceived stress and a state level of anxiety ($p<0.05$). The authors concluded that women with elevated pregnancy anxiety were 1.5 times more likely to deliver a preterm infant, a risk comparable to that of smoking. Certain characteristics predicted high pregnancy anxiety, such as unplanned pregnancy and fewer psychosocial resources. Lack of social and material resources can result in disadvantaged living conditions, education, environmental cleanliness, and employment.[16] These socioeconomic factors often produce circumstances with higher levels of chronic interpersonal discrimination and violence ($p<0.001$), which were two predictors of women who gave birth to very low birth weight infants (i.e., under 1500g) as summarized by Burris and Hacker.[16] Another study confirmed these results, showing that the odds of having a preterm infant were 1.9 times higher in women who had low social support due to a lack of resources that resulted in biologically-mediated maternal stress patterns.[17]

Socioeconomic disadvantage can be measured by neighborhood characteristics or by early life experiences, both of which have contributed to adverse birth outcomes.[18] Vast inequalities in SES have been speculated to explain the discrepancy between the United States' IMR compared to other developed countries, which is indicated by a Gini coefficient score of 0.38, the third highest among all measured countries in the Organisation for Economic Co-operation and Development (OECD).[17] The Gini coefficient ranges from 0-1, where 0 is equal distribution of wealth among all members of society and 1 is a single member possessing all wealth. Lorenz et al. confirmed this trend, demonstrating that SES disparities negatively impacted healthcare access as well as maternal behavior and disproportionately affected the poor, leading to a high IMR.[17] The United States' IMR also varies by maternal education, where babies born to mothers with a high school degree or less were approximately twice as likely to die within the first year of life compared to those born to mothers with a college degree ($p<0.0001$), as reported by Fishman et al.[19] The authors also suggest that negative maternal health behaviors that are socially patterned account for the socioeconomic distribution of poor birth outcomes. The data used for this cross-sectional study was expansive and represented a national population. However, several possible confounders were not examined, such as education, income, and health insurance, which could have influenced the results and weakened the strength of observed associations. A summary of the reviewed associations between psychosocial factors on birth outcomes can be found in *Table 2*.

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Table 2. **Summary of Associations between Socioeconomic Status, Mental Health, and Birth Outcomes.**

Factor	Observed Association	Statistical Value	Reference
Violence experienced by mother	Very low birthweight infants	p<0.001	Burris & Hacker, 2017
History of maternal depression	Pregnancy-related death	72% of deaths	Trost et al. 2021
Pregnancy anxiety	Risk of preterm infants	p<0.05	Dunkel Schetter & Tanner, 2012
Depressive symptoms due to socioeconomic stressors	Low birthweight infants	p<0.05	Dunkel Schetter & Tanner, 2012
High allostatic load due to maternal stressors	Risk of preterm and low birthweight infants	OR=1.44, 95% CI 1.02-2.08 OR=1.39, 95% CI 0.99-1.97	Walsh et al. 2019
Antenatal depression	Risk of infant being admitted to NICU	OR=1.24, 95% CI 1.14-1.35	Tyson et al. 2022
Preterm birth rates	Increased United States IMR	p<0.001	Travers et al. 2020
Maternal stress and anxiety, low SES, and race	Increased United States IMR	NA	Travers et al. 2020
Low social support leading to maternal stress	Risk of preterm infants	95% CI 1.7-2.1	Lorenz et al. 2016
SES disparities affecting the poor	Decreased healthcare access and negative maternal behaviors	NA	Lorenz et al. 2016
Socioeconomic disadvantage	Adverse birth outcomes	p<0.05	Blumenshine et al. 2010
Maternal education	Infant death within first year of life	p<0.0001	Fishman et al. 2020

Legend: OR: Odds Ratio; CI: Confidence Interval; NICU: Neonatal Intensive Care Unit; IMR: Infant Mortality Rate; SES: Socioeconomic Status; NA: Not Applicable

Theme 2: Poor Mental Health & Lower Socioeconomic Status Increase Risk of Substance Use Disorder

The U.S. Department of Health and Human Services estimates an annual impact of $442 billion from illicit drug and alcohol misuse combined, thus reflecting an extensive public health problem.[20] It is of special interest to examine the potential causal relationship of factors underlying substance abuse. A commonly researched association is that of socioeconomic status and substance use. Low socioeconomic status and substance use show reciprocity as the consequences of SUD result in socioeconomic burden, and the hardships of low SES can initiate drug use as a coping mechanism.[6] Social inequality can result in poor access to healthcare, including mental health facilities, which may exacerbate the potential for substance abuse.[21]

It is important to maximize beneficial health opportunities for those with SUD by considering both access and quality of healthcare, as well as provider attitudes toward addiction services, which have been shown to vary cross-culturally.[21] This is especially pertinent for minority groups where additional implicit bias from providers may be present, as reported by Saloner and Cook.[22] The authors also demonstrated that lower SES has been shown to increase the risk of substance use disorders in young adulthood, while highlighting that other studies have demonstrated a positive correlation between SES and substance use disorders in teenage populations. As this review is concerned with adult pregnant women, our selected studies did not primarily examine data for teenage substance use, although it is important to mention as a possible discrepancy in younger populations. Frequently, socioeconomic measures are employment-related characteristics, including education level and occupational prestige. Saloner and Cook also reported that lower levels of these factors have been shown to increase the risk of substance abuse and progression of SUD (p<0.01). This data set only included patients who were discharged from publicly funded treatment centers and may not represent outcomes for physician-provided assistance, including social support and therapy.

Correlations between mental health and SUD have been consistently demonstrated throughout literature and are a broadly studied topic. Results from the latest National Survey on Drug Use and Health (NSDUH) show that adults who had any mental illness or a serious mental illness were more likely to have used illicit drugs within the past year compared to those with no mental illness.[23] Chronic neurologic changes have been shown to develop following prolonged substance use and the resulting addiction can create a significant risk factor for suicide; SUD of any type resulted in a threefold increase in suicide risk in one study (p<0.001).[24] As substance use remains prevalent in the United States, it is important to recognize unique disparities in the groups that it affects. Some of these observed disparities and their associations with substance use are listed in *Table 3*.

Theme 3: The Intersection of Psychosocial Factors, Substance Use Disorder, & Pregnancy

Women are most likely to develop a substance use disorder during their childbearing years, and an estimated 5% of pregnant women use addictive substances.[24,25] These disorders are becoming increasingly common in women, including opioid use.[26]

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Table 3. **Summary of Associations Between Socioeconomic Status, Mental Health, and Substance Use Disorder.**

Factor	Observed Association	Statistical Value	Reference
Poor access to healthcare due to social inequalities	Higher risk of substance abuse	NA	Lewis et al. 2018
Low education level and occupational prestige	Higher risk of substance abuse and progression to SUD	p<0.01	Lewis et al. 2018
Lower SES	Decreased rates of completion of substance use treatment	p<0.0001	Saloner & Cook, 2013
Implicit bias towards minority groups	Fewer substance abuse treatment options	NA	Saloner & Cook, 2013
Adults with mental health disorders	Higher likelihood of illicit substance use within the past year	p<0.05	SAMHSA, 2022
Prolonged substance use	Chronic neurologic changes	p<0.001	Forray & Yonkers, 2021
SUD of any type	Increased risk of suicide	p<0.001	Forray & Yonkers, 2021
Psychological and social factors	No significant effect on recovery identity	Psychological: p=0.191 Social: p=0.830	Witte, Amick, & Smith, 2023
Spirituality	Positive effect on recovery identity	p=0.012	Witte, Amick, & Smith, 2023
Mindfulness exercises	Reductions in drug use and cravings	p<0.001	Vrana-Diaz et al. 2017
Women in the first five years of SUD recovery	Discontent with psychosocial factors leading to low quality of life	p<0.05	Kelly, Greene, & Bergman, 2018
CBT for women with SUD and PTSD	Increase in substance abstinence over time	p<0.008	Najavits et al. 1998

Legend: NA: Not Applicable; SUD: Substance Use Disorder; SES: Socioeconomic Status; SAMHSA: Substance Abuse and Mental Health Services Administration; CBT: Cognitive Behavioral Therapy; PTSD: Post-Traumatic Stress Disorder.

A study conducted by Brogly et al. determined the Addiction Severity Index (ASI) scores for pregnant women undergoing opioid use treatment where buprenorphine and methadone were administered and birth outcomes were measured.[3] Upon admission, the ASIs were greatest in the psychological and employment categories, indicating that the greatest stressors for patients came from these areas. Expanding upon that concept, 26.5% of participants reported that most of their income came from employment, 18.6% from illegal activities, and 61.1% from public assistance. 56.6% reported ever being sexually abused, and 65.5% reported ever being physically abused. The average years of education completed were 12 ± 1.7. These characteristics are integrated into the complex population of pregnant women who suffer from SUD. These patients commonly reported experiencing economic instability and trauma histories, as well as multiple substance use disorders, comorbidities, and legal troubles. The study reported that 90.8% of women delivered live births and emphasized a need for obstetrics and gynecology departments to improve their knowledge of opioid use in expecting mothers. It may be difficult to postulate how directly the psychosocial factors in this study impacted birth outcomes because many of these factors are broad societal influences that may confound other variables' effects.

A thorough examination of the effect that SUD has on birth outcomes was demonstrated in a study by Walton-Moss et al.[27] While it was indicated that most women decrease or discontinue substance use during pregnancy, those who did not had a higher risk of delivering a low birthweight infant. Psychosocial factors that influenced this outcome were poorer self-perception of physical health (p=0.04), more years of substance use, and having a partner with past SUD history (p=0.03). Patient demographics showed that 91.8% were unemployed and the average years of education were 11.5, which reflected the sample population from Brogly et al.[3] The primary substance of abuse was heroin, followed by cocaine. Cocaine was the most significant risk factor for low birthweight and preterm birth (p=0.01).

Psychiatric disorders and other stressors are common among pregnant women with SUD.[12] Schempf and Strobino used a biopsychosocial framework to examine this relationship by reviewing medical records and administering a post-partum interview to women who delivered a baby at Johns Hopkins Hospital.[6] The authors showed that low birth weight was influenced more by moderate to severe stress than by cocaine and had twice greater odds of low birthweight than any substance in general (p=0.001). Living in public housing and having an external locus of control regarding the expected outcome of pregnancy were also associated with significant birth weight reductions (p=0.05). Multiple other risks were identified that contributed to drug use and adverse birth outcomes including stress, delayed prenatal care, poor nutrition, and lack of material resources. It should be noted that with any retrospective study, there is potential for recall bias. The authors accentuated the need to consider contexts like disadvantaged status when studying the causes of SUD and their outcomes on birth.

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One study reported that 51.8% of pregnant patients with SUD reported having depressive symptoms within the past 30 days, and 44.7% reported anxiety.[27] More than half reported a history of some type of abuse, and 38.8% reported a history of suicide attempts. Suicidal ideation among perinatal women with SUD has increased from 1.8% to 9.3% among every 100 people in the past ten years, and it has been estimated that as many as half of pregnant women taking antidepressants discontinue them during the prenatal period.[24] Of all pregnancy-related deaths, mental health was found to be the leading preventable cause in a report reviewed by 14 state Maternal Mortality Review Committees.[12] The described mental health conditions included substance use, which was present in 67% of deaths. Among the risk factors associated with substance use deaths during pregnancy were previous suicide attempts (22%), having a child removed from the household by Child Protective Services (24%), and the cessation or dosage change of either psychiatric or substance use medications (39%). A different study elaborated upon this trend, finding that the women with SUD in their study had a 6.2-fold increased risk of suicide once they entered the postpartum period and that drug overdoses quadrupled in the 7–12-month period after delivery ($p < 0.05$).[28]

Addiction is a cyclical disease characterized by chronic relapsing features, including disregard for negative consequences.[5] It is imperative to understand the specific challenges this group faces, with pregnant women being of particular interest due to the high associations with traumatic histories and accompanying psychological disorders, which may increase the risk of relapse.[5] Numerous mediators that contribute to continued substance use in pregnancy have resulted in a heterogeneous group of women that comprise an underserved population. In a study that analyzed data from pregnant women who participated in the 2002 or 2003 National Survey on Drug Use and Health, women who were less likely to have used any substance during their pregnancy were employed ($p < 0.01$), married ($p < 0.001$), or in their second or third trimester ($p < 0.001$).[29] These results were adjusted for income, ethnicity, and age. Women who used substances during their pregnancy were more likely to be White and met the criteria for a current psychiatric illness. As a cross-sectional study, causal relationships cannot be assumed from this data. It should be noted that not all women who use substances during pregnancy have SUD or need treatment. In one study that also used NSDUH data, "treatment need" was either self-reported as needing treatment within the past year, or meeting the criteria for substance dependence or abuse.[30] After adjusting for confounding variables and pregnancy status, White women were more likely to need treatment than women of other races including Black (OR=0.61, 95% CI=0.54-0.69) and Hispanic women (OR=0.72, 95% CI=0.63-0.81). Participants who received government assistance were also more likely to need treatment (OR=1.15, 95% CI=1.03-1.28) and those who had at least a high school diploma were less likely to need treatment (OR=0.72, 95% CI=0.66-0.79). There were no significant differences in the likelihood of receiving treatment between all races and

ethnicities. It is important to mention that with any self-reported data, there is the possibility of recall bias limiting the validity of the results.

The patients who receive treatment may be managed with several medications that are currently indicated for pregnant women with opioid use disorder, including methadone and buprenorphine. Studies have shown that buprenorphine is associated with better birth outcomes and a lower risk of preterm birth compared to methadone (RR=0.40, 95% CI=0.18-0.91), as reported in one meta-analysis.[31] No differences were noted for spontaneous fetal death or congenital anomalies, though the small sample sizes of the studies may have limited the power of these associations. Pregnancy may be a distinctive time when some women become more open to substance abuse treatment, although access to treatment can be difficult.[32] Kelley et al. compared the differences in access to opioid use disorder medications between White and American Indian pregnant women by having standardized patients call seventeen rural Utah clinics to set up an appointment.[33] 47.1% of clinical staff answering the calls were unaware of buprenorphine's indication for opioid use disorder in pregnancy or did not recognize its name. Although buprenorphine treatment was available in 26.5% of calls, only 17.6% offered an appointment to receive this treatment. The most frequent reason cited for not offering an appointment was a lack of prescribers (75.0%). A proportion of clinics reported not feeling comfortable providing a pregnant patient with buprenorphine (17.9%). Of the clinics that did not have this treatment option available, 87.5% offered referrals; however, these referrals were unreachable 67% of the time. Physical distance from sites that offered buprenorphine was an obstacle as well, with distances ranging from 0-126 miles and travel time reaching up to two hours and twelve minutes. No differences were seen among White and American Indian patients, although the sample size of the phone calls was relatively small at 34 calls.

Other barriers to treatment access for pregnant women with SUD are accommodation and acceptability of providers. In a meta-analysis conducted by Joshi et al, these barriers were commonly addressed by strategies like the provision of mental health care in 50% of studies, providing patient education on pregnancy and substance use (50%), and offering childcare (30.8%) and supplementary nutrition (23.1%).[34] A little over a quarter of studies utilized therapy that reinforced positive behavior (26.9%) and 19.2% focused on improving patient-provider trust and non-judgmental communication. The authors report that very few articles attempted to mitigate the financial burden of seeking care, including accepting Medicaid coverage (7.7%) and reduced treatment fees for pregnant women (3.8%). Only 15.4% of these studies provided office-based opioid use treatment.

One population of pregnant women with opioid use disorder sampled by Miele et al. demonstrated significant differences in receiving treatment based on demographic characteristics.[35] This population included 5,541 pregnant women from seven different

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clinical sites across the United States, 79.1% of whom received treatment. Treatment medications included methadone, buprenorphine, and naltrexone. Although the authors report that some characteristics like race, ethnicity, and insurance status may have been misclassified due to clinical site differences, the data showed that patients were more likely to receive treatment if they were White (p<0.0001), older (p<0.0001), and had public insurance (p<0.0001). Rosenthal et al. reported that pregnant women of color with opioid use disorder received 36.2 milligrams less methadone than White women at the time of birth (p=0.0003), after adjusting for gestational age, maternal age, body mass index, parity, and type of opioid used.[36] It should be noted that the category "women of color" is limited in this study due to the unclear classification of Hispanic women. Pregnant women in prison have also been reported to receive varying doses of opioid use disorder medications, as demonstrated in a study by Knittel et al. that sampled pregnant women in a state women's prison facility.[37] Factors associated with a higher likelihood of receiving medication were women who had a closer level of custody (OR=2.31, 95% CI=1.41-3.77), used heroin as their primary substance (OR=2.07, 95% CI=1.17-3.66), and had received treatment before their incarceration (OR=8.47, 95% CI=4.73-15.19). There were no significant differences among age groups, race, duration of pregnancy, or education level. Of the women sampled, only 40.1% received medication during incarceration. 59.8% of this medication was methadone and 40.1% was buprenorphine. Following release, less than one-third of participants were offered a referral to an outpatient clinic that provided treatment in their community. The sample size of this population was small and only included one setting, which are limitations of this study.

Treatment program completion rates can also be affected by demographic characteristics. In a study assessing SUD treatment completion rates for pregnant women who used alcohol, marijuana, and other illicit substances, ethnicity and education differences were found to be statistically significant among the sample.[38] Black women were less likely to complete treatment than White women (OR=0.607, 95% CI=0.431-0.855), as were Hispanic women (OR=0.651, 95% CI=0.517-984). Women who had only a high school diploma were less likely to complete treatment than those who had higher levels of education (OR=0.776, 95% CI=0.606=0.993). Many factors were not significant, including age, marital status, having a mental health disorder, living arrangements, and health insurance. However, the frequency of substance use did have a significant impact, with women who used substances daily being less likely to complete treatment than those who only used sometimes (OR=0.665, 95% CI=0.527-0.840). Participants in residential treatment programs were less likely to complete the program than those in outpatient detox settings (OR=0.639, 95% CI=0.418-976). This data was collected only from publicly funded programs so selection bias may be present. In a different study examining cocaine-dependent pregnant women, the largest proportion of patients left treatment during the first three months of the program.[39] This trend was seen in both residential and outpatient settings. Residential patients reported more homelessness (p<0.0001), dissatisfaction with housing (p<0.001), and higher rates of psychiatric disorders and history of depression (p<0.05). All participants who had preterm births had completed three months or less of treatment. It should be noted that this study lacked a control group, which may limit the strength of the conclusions that were made. It is important to identify demographic characteristics that may lead to variations in treatment need, availability, and completion for pregnant women with SUD, as this is a chronic disorder that affects women of all socioeconomic backgrounds.

Martin and Parlier-Ahmad demonstrated that many experiences could prove to be traumatic in women with SUD during the prenatal period, including pregnancy-related PTSD experiences.[26] This occurrence can be especially intense in women who show concern for their baby developing neonatal withdrawal syndrome.[40] The anticipation of childbirth and associated pain is also a common stressor. Sanjuan et al. identified additional circumstances that influenced SUD-related pregnancy anxiety in their sample, such as unstable housing and income, incarceration concerns, racial discrimination, and domestic violence.[5] Participants included pregnant women currently in a treatment program for SUD who had been exposed to previous trauma. The factors that were identified all contributed to a PTSD response that resulted in temporary feelings of detachment from the fetus. This period of lowered fetal attachment led to an increase in substance craving, an instability that was shown to be transient. Further, craving was recognized as a valuable predictor of relapse as it created a significant source of distress for patients who were attempting abstinence. The authors emphasize that impediments such as fear of legal consequences, social stigma, and a deficit of trained professionals contribute to the underserved status of pregnant women with SUD.

Women who are younger and have a history of depression may also be more likely to relapse during the perinatal period, as reported in one randomized controlled trial of 152 women participating in the Psychosocial Research to Improve Drug Treatment in Pregnancy trial.[41] Participants who were over the age of 21 were less likely to relapse than younger women (p=0.021) and those who had a history of depression were more likely to relapse than those who did not (p=0.002). Cocaine use was less likely to recur in the perinatal period than other substances like alcohol (p=0.004). No other factors were significantly associated with relapse, including race, ethnicity, education, marital status, and other psychiatric disorders like dysthymia, generalized anxiety disorder, and post-traumatic stress disorder. These results suggest that many psychosocial factors may not have a strong influence on relapse risk, although the mental health disorders in this population were not specifically related to pregnancy. This study demonstrates that such disorders may affect populations differently depending on context and underscores the importance of treating women in different stages of SUD individually.

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Table 4. **Summary of Associations Between Psychosocial Factors, Substance Use, and Pregnancy.**

Factor	Observed Association	Statistical Value	Reference
Substance use during pregnancy	Higher risk of low birthweight infants	NA	Walton-Moss et al. 2009
Stress, delayed prenatal care, poor nutrition, lack of resources	Substance use during pregnancy	NA	Schempf et al, 2008
Pregnant patients with SUD	Anxiety and depressive symptoms	44.7% and 51.8% of sample, respectively	Walton-Moss et al. 2009
History of some type of abuse	Substance use during pregnancy	58.8% of sample	Walton-Moss et al. 2009
Previous suicide attempts or child removed by CPS	Pregnancy-related death	22% and 24% of deaths, respectively	Trost et al. 2021
Women with SUD	Increased risk of suicide and drug overdose in postpartum period	$p<0.05$	Schiff et al. 2014
PTSD response to stressors in pregnant women with SUD	Feelings of detachment towards fetus and increased cravings	$p<0.05$	Sanjuan et al. 2019
Social stigma, lack of trained professionals	Underserved status of pregnant women with SUD	NA	Sanjuan et al. 2019
Patients in stable remission from SUD	Lower survival rates than patients without SUD	$p<0.001$	Kline-Simon et al. 2017
Economic hurdles in SUD patients	Difficulty seeking prompt prenatal care	NA	Daley, 2013
Incarcerated pregnant patients with medium/ close custody level, heroin as primary substance, pre-incarceration MOUD	Increased likelihood of receiving MOUD while incarcerated	OR=2.31, 95% CI 1.41-3.77 OR=2.07, 95% CI 1.17-3.66 OR=8.47, 95% CI 4.73-15.19	Knittel et al. 2022
Black and Hispanic women	Less likely to need treatment for SUD than White women	Black: OR=0.61, 95% CI 0.54-0.69 Hispanic: OR= 0.72, 95% CI 0.63-0.81	Terplan et al, 2012
High school diploma or higher	Less likely to need treatment for SUD	OR=0.72, 95% CI 0.66-0.79	Terplan et al, 2012
Receiving government assistance	More likely to need treatment for SUD	OR=1.15, 95% CI 1.03-1.28	Terplan et al, 2012
Women older than 21 years	Less likely to relapse during the perinatal period than women younger than 21 years	$p=0.021$	Forray et al. 2015
Women with major depressive disorder	More likely to relapse during the perinatal period than women without major depressive disorder	$p=0.002$	Forray et al. 2015
Cocaine use	Less likely to recur during the perinatal period than alcohol	$p=0.004$	Forray et al. 2015
White women	More likely to receive MOUD in pregnancy	$p<0.0001$	Miele et al. 2023
Receiving public insurance	More likely to receive MOUD in pregnancy	$p<0.0001$	Miele et al. 2023
Pregnant women having only a high school diploma	Less likely to complete SUD treatment	OR=0.776, 95% CI 0.606–0.993	Suntai, 2021
Pregnant women engaging in daily substance use	Less likely to complete SUD treatment	OR=0.665, 95% CI 0.527–0.840	Suntai, 2021
Pregnant women in residential SUD treatment programs	Less likely to complete treatment than outpatient detox programs	OR=0.639, 95% CI 0.418-0.976	Suntai, 2021
Pregnant Black women	Less likely to complete SUD treatment than pregnant White women	OR=0.607, 95% CI 0.431-0.855	Suntai, 2021
Pregnant Hispanic women	Less likely to complete SUD treatment than pregnant White women	OR=0.651, 95% CI 0.517-0.984	Suntai, 2021
Pregnant women of color	Received less methadone dosage than pregnant White women	$p=0.0003$	Rosenthal et al. 2021
Women who reported using substances during pregnancy	More likely to be White and have current mental health disorder	$p<0.001$	Rosenthal et al. 2021
Women who were employed, married, or in their 2nd or 3rd trimester	Less likely to have used substances during pregnancy	Employed: $p<0.01$ Married: $p<0.001$ 2nd or 3rd trimester: $p<0.001$	Havens et al. 2009
Feeling of closeness with recovery network members	Decreased substance use during pregnancy	$r= -0.26$	Asta et al. 2021
Recovery network members who had used substances and provided informational support to pregnant patients	Decreased substance use during pregnancy	$r=-0.25$	Asta et al. 2021
Pregnant women with SUD receiving MET-CBT	Less preterm births than women receiving brief advice	$p=0.08$	Yonkers et al. 2012
Pregnant patients receiving MET that included brief motivational techniques	Decreased illicit drug use than patients who received treatment as usual	$p<0.01$	Osterman et al, 2017
Buprenorphine treatment in pregnant women with SUD	Lower risk of preterm birth compared to methadone	RR = 0.40, 95% CI = 0.18-0.91	Zedler et al. 2016
Pregnant women with cocaine dependence in residential treatment program	More likely to be homeless, dissatisfied with living arrangements, and have depression than patients in outpatient setting	Homeless: $p<0.0001$. Dissatisfied with housing: $p<0.001$. Depression: $p<0.05$	Comfort et al, 1999

Legend: NA: Not Applicable; SUD: Substance Use Disorder; CPS: Child Protective Services; PTSD: Post-Traumatic Stress Disorder; MOUD: Medications for Opioid Use Disorder; OR: Odds Ratio; CI: Confidence Interval; MET: Motivational Enhancement Therapy; CBT: Cognitive Behavioral Therapy; RR: Relative Risk.

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In one study, pregnant participants who had completed treatment at a facility for SUD mentioned the importance of emotional support more commonly than practical support when completing the study.[42] Social support that was recovery-oriented and included family members or other community members that had shared similar experiences was listed as a helpful asset during recovery, including program staff that had adequate cultural competence, defined as the ability to effectively communicate with people from different backgrounds. This was a short study and only included women who had completed treatment, so the results may not be generalizable. The postpartum period generates yet more obstacles for many mothers, including altered sleep patterns and mental health struggles.[26] For those with SUD, these hardships can be exacerbated by unstable family dynamics, substance use recurrence, and stigma surrounding their substance use history. In a study of individuals who had successfully completed a treatment program 13 years prior, remission trajectories determined that those in stable remission had overall lower survival rates than non-SUD patients (p<0.001).[7] This emphasizes the need for personalized healthcare for patients well beyond the length of treatment programs, especially for patients in an imperative state of health such as pregnancy. A summary of the associations found between psychosocial factors, SUD, and pregnancy can be found in *Table 4*.

Discussion

It is estimated that under 13% of pregnant women and 10% of non-pregnant mothers who need SUD treatment receives it.[26] The underlying determinants of this condition in pregnancy often overlap and create a population that is difficult to treat. Women with SUD comprise a vulnerable population that may be more susceptible to relapse and craving than their male counterparts and more likely to endorse negative beliefs toward treatment such as pessimism and fear.[8,43] In one study, women experienced greater difficulty during the first five years of remission due to dissatisfaction with the psychological, social, and physical features of their lives, which led to a lower quality of life and self-esteem.[44] As the effect of SUD on adverse birth outcomes has been well documented, healthcare providers must focus on preventing relapse in those who are abstaining from use during pregnancy.

Most women who become pregnant have reported discontinuing the use of substances that they were previously taking.[27] Still, there is a gap in the literature addressing pregnant women who have been in sustained or stable recovery from SUD past the timeframe of treatment. Sustained recovery is defined as over one year with no substance use and stable recovery as over 5 years.[8] This distinctive population has only been mentioned a few times in current research. The proportion of women participants in sustained or stable remission following treatment could make up a sizable proportion of all people in remission and constitutes a group that has not been clearly identified. Further, the members of this population who become pregnant have not been outlined at all. Pregnant women in the maintenance phase of recovery are not synonymous with those actively engaging in addictive behaviors and substance use.

Addiction is a chronically recurring disorder and those at different stages of the cycle should be treated individually, as the triggers they experience may differ significantly. Depending on the history of the patient, it can be hypothesized that clinical triggers that precipitate substance use-related pregnancy anxiety may include the pregnancy itself, venous punctures, and pain management during and after birth. These aggravating factors may be more robust for patients with a history of intravenous drug use and opioid use disorder. Prenatal care is associated with a lower risk of low birthweight and preterm infants, but there are many reasons why women with SUD may not seek prompt prenatal care.[45] Economic hurdles that are common in patients with SUD, such as a past criminal record, unemployment, or dependence on welfare, can complicate their ability to seek prompt prenatal care when in remission.[4] Other studies assessing variables important to recovery have demonstrated that psychosocial factors did not have a significant effect on recovery identity, or how much a person identifies themselves as "in recovery", but spirituality did.[46]

Patient perspectives give us insight into the challenges that pregnant women with SUD face, which are important to consider when creating personalized treatment plans for this population. In a study conducted by Schmidt et al., surveys were administered to women in opiate treatment programs and homeless shelters in San Francisco to gather patient viewpoints on reproductive healthcare.[47] One participant described an appointed social worker as a valuable tool who provided a lot of care, direction, and assistance during her pregnancy. Another patient reported that healthcare providers could improve patient care of this population by treating them the same as other patients and stated, "You know [we] are normal people just like you and anybody else." Twenty-six healthcare settings that offered reproductive services and substance use treatment were also interviewed and mostly focused on improving logistical barriers, whereas the patients mostly advocated for an improved healthcare environment. It is important to acknowledge this discrepancy between the improvements that patients and providers prioritized, although this study only represents a small sample of one city.

Many women with SUD avoid seeking prenatal care altogether to minimize any fear and stigma they may face, regardless of their need for treatment or ability to receive it. A survey that was administered to thirty women in a Midwestern city who had used alcohol or other drugs during their pregnancy showed that many of the participants feared that their healthcare provider would detect their substance use, which resulted in 54.5% using avoidance strategies like scheduling appointments around their substance use, skipping visits, or not seeking prenatal care at all.[48] Others were honest with their care team and described the negative experiences that resulted. One patient said that she felt like being honest with her doctors would help her child but stated "All I did was damage that relationship and our early bonding". Another woman explained why she avoided prenatal visits after the first appointment, saying "They told me if they see THC or

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something like that in my system, then protective services would get involved." Even the women who continued care and underwent substance use detoxification reported that the programs did not address how to deal with triggers, which was detrimental when they returned to the same environments that they had been in before treatment.

Mindfulness exercises have been used successfully to reduce drug use and cravings in pregnancy.[49] Using meditation as a tool, the participants in one study were able to directly approach unwanted emotions and memories versus defaulting to harmful avoidance strategies. Similar patient populations have been shown to benefit greatly from peer support specialists.[50] One participant described the experience of their newborn suffering from neonatal withdrawal syndrome and being removed from the room after birth as a "very traumatic, traumatic time" and outlined the confusion that ensued from a lack of guidance by healthcare providers. A greater trust was placed in peer support specialists than in healthcare professionals and the desire to have this support prior to, during, and after birth was expressed by several participants. Further, it was more helpful to have assistance in problem-solving than just instruction. It has been demonstrated in another sample that patients with SUD who felt their providers gave informational support and a feeling of closeness used less substances during pregnancy ($r= -0.25$).[51] Fostering a nonjudgmental and supportive environment as a healthcare provider is pivotal to increase the likelihood of patients being receptive to treatment. The literature has reported the efficacy of pharmacologic treatments for pregnant women with SUD but utilizing evidence-based mental health resources and screening tools may be beneficial as well.

Psychological interventions aimed at minimizing substance use and adverse birth outcomes in pregnant women with SUD have included SBIRT, MET, and CBT. Strategies of SBIRT include screening for high-risk patients and providing connections for treatment. This type of management has been described in several randomized controlled trials and has shown great benefit.[9] Therapies used in treatment can include MET and CBT. One study showed that women whose treatment included MET with brief motivational techniques demonstrated less illicit drug use over time than women who received control treatment ($p<0.01$).[52] In women with concurrent SUD and PTSD, CBT has been shown to increase the length of abstinence after treatment ($p<0.008$).[53] In a study that trained nurses during a multi-day workshop to administer both MET and CBT techniques to pregnant women with SUD, the treated group showed no statistical difference in the number of days that substances were used before or after delivery but did show fewer preterm births than those who received only brief advice ($p=0.08$).[54] Brief advice lasted around one minute and included guidance on the risks of substance use during pregnancy and the benefits of seeking treatment. This study may have been limited by the unequal treatment groups and a small sample size because the MET-CBT groups had lower attendance due to the longer time that was required versus the one-minute brief advice treatment. MET-CBT may also be more expensive for patients than brief advice. In a micro-costing study that assessed the monetary cost and resource utilization cost, including the time spent for each session, MET-CBT intervention cost \$1469 per patient, whereas brief advice cost \$316 per patient.[55] These types of therapies that have shown efficacy in pregnant women with SUD may also be beneficial to women who are in sustained remission and have been identified by a screening tool such as SBIRT.

Pregnancy is a unique time for observational studies due to the potential to minimize recall errors by recording real-time data as the patients experience it, notably as it relates to pregnancy-related triggers in SUD. Future studies should examine the independent effects of socioeconomic status and mental health on relapse rates in pregnant women who are in sustained or stable recovery. Continued evaluation should include the length and severity of relapse and ultimately the effect on birth outcome. By assessing the relative impact of each variable and developing a weighted prognostic system to predict relapse in this population, potential screening tools and interventions may be introduced.

Limitations
Narrative reviews are a collection and summarization of previous research to identify what is known about a subject and what needs further investigation. The process of finding resources to fulfill this objective makes this type of review susceptible to selection bias. Since the population of interest was in the United States, only English-language studies were selected. This also creates a bias that may have been mitigated through the inclusion of other languages. The heterogeneity of the included studies prevents meaningful quantitative comparison, which may reduce the predictive value of the clinical recommendations that were based on these relationships. Finally, the independent effects of psychosocial factors on health outcomes are difficult to measure because multiple factors are usually present that create confounding variables.

The limitations of this study were countered with mitigation strategies such as a search strategy with well-defined inclusion and exclusion criteria and assessing each source for study design, sample population, and statistical significance.

Future Directions
Future studies could be improved by observing and studying pregnant women who are in stable or sustained remission from substance use disorder. The use of ecological momentary assessments would provide the most valuable and unbiased data on real-time emotions being experienced throughout the study. Examples of measurable factors that may influence pregnancy-related psychological distress related to the maintenance of sobriety in this population include perceived physician bias, specific fears including relapse and pain, PTSD episodes, and substance use triggers. The magnitude of these effects should be analyzed using multiple linear regression. Rates of relapse and infant morbidity should ultimately be evaluated.

These studies' outcomes could help develop a screening questionnaire to identify pregnant women at the highest risk of relapse. Interventional strategies such as CBT, MET, peer-led

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support personnel, mindfulness exercises, and spiritual groups may then be implemented. Physicians have reported a lack of time with patients as a major obstacle to screening questionnaires.[10] Utilizing a social worker or other appointed healthcare worker who could provide access to these resources or referral to psychiatric treatment after a patient has been identified as at-risk, may be the best practice. Healthcare providers must continue this degree of personalized care for pregnant women with a history of substance use disorder even if the patient is in sustained remission and does not spontaneously offer information about experienced stress.

Observational studies are the best approach to collect qualitative data describing how a pregnant patient feels in response to stressors. However, researchers using this method may experience limitations including selection bias and confounding bias, as variables are difficult to control. Further, the Hawthorne effect may be possible if data is being recorded in real time using ecological momentary assessments. Minimizing confounding variables as much as possible would be crucial to maintain the highest amount of validity when describing observed relationships.

Summary – Accelerating Translation

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The United States has had a higher infant mortality rate (IMR) than other developed countries for years. Efforts have increasingly focused on psychological and social factors including socioeconomic status (SES) and mental health. One group of people who are uniquely affected by these factors during pregnancy are those with substance use disorder (SUD), and it has been well-documented that substance use during pregnancy leads to an increased risk of negative birth outcomes. Usually, when the relationship between substance use and birth outcomes is examined, broader influences like SES and chronic mental health disorders are considered indirect stimuli of substance use. Further, these psychosocial factors also affect birth outcomes independently so it can be hard to discern their individual effects on substance use during pregnancy. The purpose of this paper is to review what is known about the effect of psychosocial factors on birth outcomes as well as substance use on birth outcomes and to outline a group where these influences may have a more direct effect on substance use in pregnant women. This unique group is women who are in remission from SUD. This is an important distinction to make because most of the available research focuses on pregnant women who are in active addiction or those who have been recently enrolled in a rehabilitation program. Women who have been sober for years are not synonymous with the previously researched populations and may have triggers stemming from psychosocial factors that directly affect their desire to use or concerns about remaining sober while pregnant. It is important to consider the social aspects of health so personalized healthcare plans can be created for each patient.

To review the literature, several academic databases were used including EBSCOhost, PubMed, Scopus, and Wiley Journals. Searches included terms such as 'history of substance abuse and birth outcomes', 'socioeconomic status and mental health on infant mortality rate', and 'pregnancy anxiety and substance use disorder'. Many articles were originally extracted to demonstrate the previous associations that have been made between those variables. Eleven articles were excluded because they had a sample population that was inapplicable to the paper's purpose, the study took place in a country other than the United States, and miscellaneous reasons that deemed the study irrelevant to the topic. Fifty-five references were included for review and use.

After reviewing the included articles, a few themes were consistently demonstrated. Socioeconomic disadvantages such as lack of maternal resources, low social support, disparities disproportionately affecting the poor, and low maternal education led to an increased risk of very low birthweight infants, preterm infants, and infant death within the first year of life. Mental health obstacles like pregnancy anxiety, depressive symptoms due to socioeconomic stressors, and antenatal depression led to an increased risk of low birthweight infants, preterm infants, and an infant being admitted to the neonatal intensive care unit (NICU). Both maternal stressors and preterm births were shown to contribute to the United States' high IMR. The second theme observed was the effect of mental health and SES on substance use. Poor access to healthcare and lower education levels were shown to increase the risk of substance abuse. Implicit bias from providers was associated with fewer SUD treatment options and lower SES with decreased rates of treatment completion. Adults who had mental health disorders had an increased risk of SUD and those with SUD had a higher risk of suicide. Finally, several studies showed that women with SUD had a higher risk of low birthweight infants. Substance use during pregnancy was influenced by social stigma, economic hurdles, and lack of resources.

In conclusion, high levels of maternal stress and anxiety as well as lower socioeconomic status can lead to an increased risk of adverse birth outcomes. Women with substance use disorder also have an increased risk of infant morbidity and mortality, of which most cases were caused by preterm births. Pregnant women with SUD are an underserved population that may be influenced by a variety of psychosocial factors. A lack of trained professionals and delayed prenatal care due to social concerns are two of these factors. Most notably, one study described the idea of pregnancy anxiety in women with SUD, which was exacerbated by post-traumatic stress disorder (PTSD) responses to certain stressors. These stressors included concern for their baby developing withdrawal symptoms at birth, fear of legal consequences, and unstable housing and income. The resulting PTSD response led to temporary feelings of detachment from the fetus and increased cravings. However, this study used a sample of women who were in the active stages of addiction and not remission. Another study showed that all participants who were in ongoing remission from SUD 13 years after the study still had an overall increase in mortality risk than individuals who had never had SUD. This highlights the importance of considering women who are in remission from SUD as a distinct population that may have different levels of stress directly associated with maintaining sobriety throughout pregnancy as opposed to someone who is actively using or in a rehabilitation facility. This stress and/or SES hurdles could result in instability that may make relapse and adverse birth outcomes more likely during this imperative time.

These findings provide background information and guidance for future studies that may use techniques like ecological momentary assessments to measure the anxiety experienced by pregnant women in remission from SUD. Screening questionnaires may be used to screen for high-risk factors that may increase the risk of relapse and ultimately adverse birth outcomes and IMR in this population.

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References

1. The Organisation for Economic Co-operation and Development. Health status - Infant mortality rates - OECD Data. 2023. Available from: https://data.oecd.org/healthstat/infant-mortality-rates.htm. Last updated 2022; cited Sep 12, 2022.

2. Matoba N, Collins JW. Racial disparity in infant mortality. Semin Perinatol. 2017;41(6):354–9.

3. Brogly SB, Saia KE, Werler MM, Regan E, Hernández-Díaz S. Prenatal Treatment and Outcomes of Women With Opioid Use Disorder. Obstet Gynecol. 2018;132(4):916–22.

4. Daley DC. Family and social aspects of substance use disorders and treatment. J Food Drug Anal. 2013;21(4):S73–6.

5. Sanjuan PM, Pearson MR, Fokas K, Leeman LM. Supplemental Material for A Mother's Bond: An Ecological Momentary Assessment Study of Posttraumatic Stress Disorder Symptoms and Substance Craving During Pregnancy. Psychol Addict Behav. 2019;34(2).

6. Schempf AH, Strobino DM. Illicit Drug Use and Adverse Birth Outcomes: Is It Drugs or Context? J Urban Health. 2008;85(6):858–73.

7. Kline-Simon AH, Chi FW, Mertens JR, Weisner C. Trajectories of remission and mortality over 13 years after intake to substance use treatment. Am J Drug Alcohol Abuse. 2017;43(5):583–90.

8. National Institute on Alcohol Abuse and Alcoholism. Recovery Research Definitions. Available from: https://www.niaaa.nih.gov/research/niaaa-recovery-from-alcohol-use-disorder/definitions. Cited Dec 09, 2022.

9. Madras BK, Compton WM, Avula D, Stegbauer T, Stein JB, Clark H Westley. Screening, brief interventions, referral to treatment (SBIRT) for illicit drug and alcohol use at multiple healthcare sites: Comparison at intake and 6 months later. Drug Alcohol Depend. 2009;99(1-3):280–95.

10. Hargraves D, White C, Frederick R, Cinibulk M, Peters M, Young A, et al. Implementing SBIRT (Screening, Brief Intervention and Referral to Treatment) in primary care: lessons learned from a multi-practice evaluation portfolio. Public Health Rev. 2017;38(1).

11. Travers CP, Iannuzzi LA, Wingate MS, Avery DM, Ambalavanan N, Leeper J, et al. Prematurity and race account for much of the interstate variation in infant mortality rates in the United States. J Perinatol. 2020;40(5):767–73.

12. Trost SL, Beauregard JL, Smoots AN, Ko JY, Haight SC, Moore Simas TA, et al. Preventing Pregnancy-Related Mental Health Deaths: Insights From 14 US Maternal Mortality Review Committees, 2008–17. Health Aff. 2021;40(10):1551–9.

13. Walsh K, McCormack CA, Webster R, Pinto A, Lee S, Feng T, et al. Maternal prenatal stress phenotypes associate with fetal neurodevelopment and birth outcomes. Proc Natl Acad Sci U S A. 2019;116(48):23996–4005.

14. Dunkel Schetter C, Tanner L. Anxiety, depression and stress in pregnancy. Curr Opin Psychiatry. 2012;25(2):141–8.

15. Tyson DP, Kelleher KJ, Chavez LJ. Mental Health-related Utilization of Emergency Departments During Pregnancy in the U.S., 2016–2019. Matern Child Health J. 2022;26(10):1953–8.

16. Burris HH, Hacker MR. Birth outcome racial disparities: A result of intersecting social and environmental factors. Semin Perinatol. 2017;41(6):360–6.

17. Lorenz JM, Ananth CV, Polin RA, D'Alton ME. Infant mortality in the United States. J Perinatol. 2016;36(10):797–801.

18. Blumenshine P, Egerter S, Barclay CJ, Cubbin C, Braveman PA. Socioeconomic Disparities in Adverse Birth Outcomes. Am J Prev Med. 2010;39(3):263–72.

19. Fishman SH, Hummer RA, Sierra G, Hargrove T, Powers DA, Rogers RG. Race/ethnicity, maternal educational attainment, and infant mortality in the United States. Biodemography Soc Biol. 2020;66(1):1–26.

20. Office of the Surgeon General for United States Department of Health and Human Services. Addiction and Substance Misuse Reports and Publications. Available from: https://www.hhs.gov/surgeongeneral/reports-and-publications/addiction-and-substance-misuse/index.html. Last updated Mar 29, 2019; cited Dec 09, 2022.

21. Lewis B, Hoffman L, Garcia CC, Nixon SJ. Race and Socioeconomic Status in Substance Use Progression and Treatment Entry. J Ethn Subst Abuse. 2018;17(2):150–66.

22. Saloner B, Cook BL. Blacks And Hispanics Are Less Likely Than Whites To Complete Addiction Treatment, Largely Due To Socioeconomic Factors. Health Aff. 2013;32(1):135–45.

23. National Survey on Drug Use and Health. Key Substance Use and Mental Health Indicators in the United States: Results from the 2020 National Survey on Drug Use and Health. Available from: https://www.samhsa.gov/data/sites/default/files/reports/rpt35325/NSDUHFFRPDFWHTMLFiles2020/2020NSDUHFFR1PDFW102121.pdf. Last updated 2021; cited Dec 09, 2022.

24. Forray A, Yonkers KA. The Collision of Mental Health, Substance Use Disorder, and Suicide. Obstet Gynecol. 2021;137(6):1083-1090. Epub May 06, 2021.

25. National Institute on Drug Abuse. Substance Use in Women Drug Facts. Available from: https://nida.nih.gov/publications/drugfacts/substance-use-in-women. Last updated 2020; cited Dec 09, 2022.

26. Martin CE, Parlier-Ahmad AB. Addiction treatment in the postpartum period: an opportunity for evidence-based personalized medicine. Int Rev Psychiatry. 2021;33(6):579–90.

27. Walton-Moss BJ, McIntosh LC, Conrad J, Kiefer E. Health Status and Birth Outcomes Among Pregnant Women in Substance Abuse Treatment. Womens Health Issues. 2009;19(3):167–75.

28. Schiff DM, Nielsen T, Terplan M, Hood M, Bernson D, Diop H, et al. Fatal and Nonfatal Overdose Among Pregnant and Postpartum Women in Massachusetts. Obstet Gynecol. 2018;132(2):466–74.

29. Havens JR, Simmons LA, Shannon LM, Hansen WF. Factors associated with substance use during pregnancy: Results from a national sample. Drug Alcohol Depend. 2009; 99(1-3):89–95.

30. Terplan M, McNamara EJ, Chisolm MS. Pregnant and Non-Pregnant Women with Substance Use Disorders: The Gap Between Treatment Need and Receipt. J Addict Dis. 2012; 31(4):342–9.

31. Zedler BK, Mann AL, Kim MM, Amick HR, Joyce AR, Murrelle EL, et al. Buprenorphine compared with methadone to treat pregnant women with opioid use disorder: a systematic review and meta-analysis of safety in the mother, fetus and child. Addiction. 2016;111(12):2115–28.

32. Flavin J, Paltrow LM. Punishing pregnant drug-using women: Defying law, medicine, and common sense. J Addict Dis. 2010;29(2), 231–244.

33. Kelley AT, Smid MC, Baylis JD, Charron E, Begaye LJ, Binns-Calvey A, et al. Treatment access for opioid use disorder in pregnancy among rural and American Indian communities. J Subst Abuse Treat. 2021;136:108685.

34. Joshi C, Skeer MR, Chui K, Neupane G, Koirala R, Stopka TJ. Women-centered drug treatment models for pregnant women with opioid use disorder: A scoping review. Drug Alcohol Depend. 2021;226:108855.

35. Miele K, Kim SY, Jones R, Rembert J, Wachman E, Shrestha H. Medication for Opioid Use Disorder During Pregnancy — Maternal and Infant Network to Understand Outcomes Associated with Use of Medication for Opioid Use Disorder During Pregnancy (MAT-LINK), 2014–2021. MMWR Surveill Summ. 2023;72(No. SS-3):1-14.

36. Rosenthal EW, Short VL, Cruz Y, Barber C, Baxter JK, Abatemarco DJ, et al. Racial inequity in methadone dose at delivery in pregnant women with opioid use disorder. J Subst Abuse Treat. 2021;131:108454.

37. Knittel AK, Swartzwelder RA, Zarnick S, Tsujimoto THM, Horne T, Lin FC, et al. Medications for opioid use disorder during pregnancy: Access and continuity in a state women's prison facility, 2016–2019. Drug Alcohol Depend. 2022;232:109308.

38. Suntai Z. Substance use among women who are pregnant: Examining treatment completion by race and ethnicity. J Subst Abuse Treat. 2021;131:108437.

39. Comfort M, Kaltenbach KA. Biopsychosocial Characteristics and Treatment Outcomes of Pregnant Cocaine-Dependent Women in Residential and Outpatient Substance Abuse Treatment. J Psychoact Drugs. 1999;31(3):279–89.

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Dailey AR.

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40. Buczkowski A, Avidan O, Cox D, Craig A. The Parental Experience of Newborns With Neonatal Abstinence Syndrome Across Inpatient Care Settings. J Addict Med. 2020;14(5):1.

41. Forray A, Merry B, Lin H, Ruger JP, Yonkers KA. Perinatal substance use: A prospective evaluation of abstinence and relapse. Drug Alcohol Depend. 2015;150:147–55.

42. McCarron H, Griese ER, Dippel E, McMahon TR. Cultural and Social Predictors of Substance Abuse Recovery among American Indian and Non-American Indian Pregnant and Parenting Women. J Psychoact Drugs. 2018;50(4):322–30.

43. Verissimo ADO, Grella CE. Influence of gender and race/ethnicity on perceived barriers to help-seeking for alcohol or drug problems. J Subst Abuse Treat. 2017;75:54–61.

44. Kelly JF, Greene MC, Bergman BG. Beyond Abstinence: Changes in Indices of Quality of Life with Time in Recovery in a Nationally Representative Sample of U.S. Adults. Alcohol Clin Exp Res. 2018;42(4):770–80.

45. Cunningham SD, Lewis JB, Shebl FM, Boyd LM, Robinson MA, Grilo SA, et al. Group Prenatal Care Reduces Risk of Preterm Birth and Low Birth Weight: A Matched Cohort Study. J Women's Health. 2019;28(1):17–22.

46. Witte T, Amick M, Smith J. Recovery Identity and Psychosocial-Spiritual Health: A Survey of Individuals in Remission From Substance Use Disorders. J Drug Issues. 2022;53(3):002204262211330.

47. Schmidt CN, Wingo EE, Newmann SJ, Borne DE, Shapiro BJ, Seidman DL. Patient and provider perspectives on barriers and facilitators to reproductive healthcare access for women experiencing homelessness with substance use disorders in San Francisco. Women's Health (London). 2023;19:174550572311523.

48. Stone R. Pregnant women and substance use: fear, stigma, and barriers to care. Health Justice. 2015;3(1).

49. Vrana C, Killeen T, Brant V, Mastrogiovanni J, Baker NL. Rationale, design, and implementation of a clinical trial of a mindfulness-based relapse prevention protocol for the treatment of women with comorbid post traumatic stress disorder and substance use disorder. Contemp Clin Trials. 2017;61:108–14.

50. Fallin-Bennett A, Elswick A, Ashford K. Peer support specialists and perinatal opioid use disorder: Someone that's been there, lived it, seen it. Addict Behav. 2020;102:106204.

51. Asta D, Davis A, Krishnamurti T, Klocke L, Abdullah W, Krans EE. The influence of social relationships on substance use behaviors among pregnant women with opioid use disorder. Drug Alcohol Depend. 2021;222:108665.

52. Osterman R, Lewis D, Winhusen T. Efficacy of motivational enhancement therapy to decrease alcohol and illicit-drug use in pregnant substance users reporting baseline alcohol use. J Subst Abuse Treat. 2017;77:150–5.

53. Najavits LM, Weiss RD, Shaw SR, Muenz LR. "Seeking safety": Outcome of a new cognitive-behavioral psychotherapy for women with posttraumatic stress disorder and substance dependence. J Trauma Stress. 1998;11(3):437–56.

54. Yonkers KA, Forray A, Howell HB, Gotman N, Kershaw T, Rounsaville BJ, et al. Motivational enhancement therapy coupled with cognitive behavioral therapy versus brief advice: a randomized trial for treatment of hazardous substance use in pregnancy and after delivery. Gen Hosp Psychiatry. 2012;34(5):439–49.

55. Xu X, Yonkers KA, Ruger JP. Costs of a Motivational Enhancement Therapy Coupled with Cognitive Behavioral Therapy versus Brief Advice for Pregnant Substance Users. PLoS One. 2014;9(4):e95264.