Risky Business: Prenatal Substance Use and Risk of Harm under the G2i Framework

Nicole Rubin†*

“While science attempts to discover the universals hiding among the particulars, trial courts attempt to discover the particulars hiding among the universals.”

ABSTRACT

Throughout the United States, pregnant people are incarcerated for using drugs during pregnancy. The criminalization of prenatal substance use is justified by legislatures and courts on the notion that a person puts their fetus at substantial risk when they ingest drugs. But scientific literature demonstrates that this may not be true. Beyond this, scientific evidence demonstrates that racism and the conditions of living in poverty pose threats to fetal development, potentially stronger ones than those posed by drug use. The laws criminalizing prenatal substance use, and the courts enforcing them, ignore these findings. In a criminal case for fetal harm based on prenatal substance use, the question is often whether a defendant, most often a low-income person of color, caused or risked causing harm to their fetus as a result of drug use. The legal system generally assumes that the only cause of harm is drug use, ignoring that any number of other factors could result in statistically possible or actual harm to a fetus. It is impossible to distinctly discern which factor, among an intersection of influences, caused any fetal harm if it occurred at all. Yet, in prenatal substance use cases, the current practice is for courts to rely on expert testimony to prove that the drug use caused harm, though determining the actual cause of harm is often outside their expertise. This Note argues that courts can more accurately assess the scientific validity of prenatal substance use charges by adopting a mode of analysis called the G2i framework. Applying this framework to prenatal substance use cases would be novel and holds promise to ensure courts apply the proper level of scrutiny to scientific evidence presented in criminal cases writ large.

†This Note was written prior to the Supreme Court’s decision to revoke the constitutional right to abortion. As such, only the conclusion touches on the impact this has on the criminalization of pregnancy within the United States.

* J.D., Harvard Law School, 2022; M.S. in Criminology, University of Pennsylvania, 2019; B.A., University of Pennsylvania, 2019. I would like to thank Dean David Faigman of UC Hastings for introducing me to G2i theory, giving feedback, and showing such generosity with his time in discussing this new application of the theory. I am also grateful to the National Advocates for Pregnant Women (NAPW) for their tireless advocacy on behalf of unjustly criminalized pregnant people, as well as Samantha Lee for discussing with me the under-researched areas of law pertinent to NAPW’s work. Finally, I am thankful for the editors of the Harvard Civil Rights-Civil Liberties Law Review for their insightful editing, and Thomas Freeman in particular.

# Table of Contents

## Introduction .......................................................... 791

### I. Contextualizing the Criminalization of Prenatal Substance Use .................................................. 794

#### A. The Historical Focus On Black People Using Drugs: A Review Of Systemic Oppression .......................... 796

#### B. The Relationship Between Cocaine Ingestion And Fetal Harm: An Evaluation Of The Evidence ................. 801

### II. Criminalization of Prenatal Substance Use and Relevant Statutory Provisions .................................. 811

#### A. Statutes Under Which Prenatal Substance Use Is Charged .............................................................. 812

1. State statutes requiring harm or unreasonable risk of harm to the fetus ............................................. 813

2. Federal prosecution of prenatal substance abuse ........................................................................ 816

#### B. Evidence Of Fetal Harm In Prenatal Substance Use Prosecutions ...................................................... 818

1. Physician and law enforcement testimony on fetal harm ........................................................................ 818

2. Courts are currently ill-equipped to be scientific fact-finders ......................................................... 819

#### C. Judicial Treatment Of The Causal Relationship Between Cocaine Use And Fetal Harm ......................... 820

### III. Using The G2i Framework To Analyze The Causal Relationship Between Prenatal Substance Use And Fetal Harm ................................................................. 820

#### A. Assessing Scientific Validity In The Courtroom: Frye And Daubert ..................................................... 821

#### B. The G2i Framework As An Alternative Evidentiary Standard ............................................................. 824

#### C. The G2i Framework Applied To Prenatal Substance Use ................................................................. 825

1. “Ruling in” or general causation ........................................................................................................... 827

2. “Ruling out” or specific causation ......................................................................................................... 828

#### D. Poverty As A Confounder In The Causal Relationship Between Substance Use And Fetal Harm ............. 829

### Conclusion ................................................................. 832
INTRODUCTION

In November 2006, Rennie Gibbs suffered a stillbirth; the umbilical cord had been wrapped around the baby’s neck. Within days, the stillbirth was ruled a homicide. The medical examiner hired to perform the baby’s autopsy had found a cocaine byproduct in Gibbs’ bloodstream. As a result, Gibbs, a Black teenager, was charged with “depraved heart murder.” This charge rested on the theory that, by smoking crack during pregnancy, she caused the death of her baby. She faced a sentence of life in prison for this charge.

The medical examiner employed by the prosecution in Gibbs’ case was “highly controversial.” He has been repeatedly hired by the state of Mississippi and other states to perform autopsies “[d]espite never having completed his certification test for the American Board of Pathology” and having been accused of “being sloppy, exaggerating his credentials, and leaping to conclusions that sometimes had no basis in science.” Gibbs argued, in her defense against the charge of depraved heart murder, that the medical examiner did not order tests to rule out other common causes of stillbirth. In 2014, the charges against Gibbs were dismissed without prejudice. Soon after, however, the prosecutor vowed to re-indict Gibbs, this time for manslaughter, which comes with a penalty of up to 20 years in prison.

Though there are many stories like that of Rennie Gibbs throughout the United States, such stories are rarely told at trial; most criminal charges of

---

3. Id.
5. Id.
7. Id.
8. Martin, supra note 2.
9. Id.
10. Id.
11. Pieklo, supra note 3.
12. See id.
prenatal substance use result in a guilty pleas.\textsuperscript{14} Those who have gone to trial, were convicted, and later appealed their convictions, however, have largely seen those convictions overturned.\textsuperscript{15} Of the successful appeals, most center on how criminal statutes are interpreted,\textsuperscript{16} turning on whether the word “child” in the relevant statute includes a fetus (often finding it does not).\textsuperscript{17} Some successful appeals have won on questions of due process or privacy, with courts finding that the prosecution violated one of these constitutional commands.\textsuperscript{18} However, courts rarely consider the scientific validity of prenatal substance use charges. In particular, few courts have been concerned with, at least as a primary matter, whether the pregnant person actually caused or posed substantial risk of harm to the fetus by ingesting drugs. But it is vital that courts do focus on, or at least consider, whether the criminal charges are scientifically valid. While a legislature determines a state’s criminal code and a prosecutor enforces it, it is courts that must ensure that a person charged with a crime has been found guilty beyond a reasonable doubt before being convicted. Without addressing whether ingesting a substance, such as cocaine, actually harms a fetus in the specific case at hand, courts are failing to perform their central function in establishing that a conviction is based on evidence beyond a reasonable doubt.

The laws criminalizing prenatal substance use, and the courts enforcing them, ignore evidence of factors other than drug use that may cause fetal harm. In a criminal case for fetal harm based on prenatal substance use, the question is whether a defendant caused harm to their fetus as a result of drug use. Often, the mere act of drug use is solely considered as the potential cause of harm. That analysis ignores the substantial evidence demonstrating that socioeconomic status and racial group are strongly associated with adverse birth outcomes, and the majority of those arrested for prenatal substance use are low-income women and women of color. In the large proportion of cases, any number of factors other than drug use could result in statistically possible or actual harm to a fetus. By ignoring other potential causes of harm to the fetus prosecutors fail to establish defendants’ guilt beyond a reasonable doubt, and courts sanction it. This Note considers the impact poverty has on harming a fetus. Specifically, this Note argues that the presence of other potentially harmful factors to a fetus creates a degree of reasonable doubt that is nearly impossible to overcome. Thus, prenatal substance use prosecutions threaten incarceration for one action (drug use), even

\textsuperscript{14} See Myrisha S. Lewis, Criminalizing Substance Abuse and Undermining Roe v. Wade: The Tension Between Abortion Doctrine and the Criminalization of Prenatal Substance Abuse, 23 WM. & MARY J. WOMEN & L. 185, 193 (2017).

\textsuperscript{15} See Dorothy E. Roberts, Unshackling Black Motherhood, 95 MICH. L. REV. 938, 939 (1997); see also Cara Angelotta & Paul S. Applebaum, Criminal Charges for Child Harm from Substance Use in Pregnancy, 45 J. AM. ACAD. PSYCHIATRY L. 193, 200 (2017).

\textsuperscript{16} See id. at 940.

\textsuperscript{17} See id.

\textsuperscript{18} See id.
though a fetus could be predisposed to the same alleged harm due to other circumstances, such as poverty, thereby often criminalizing the fact of being pregnant while poor.

In prenatal substance use cases, the current practice is for courts to rely strongly on expert testimony, such as that of the medical examiner in Gibbs’ case. Experts can offer general statements about the impacts of drug ingestion on pregnancy, based on “aggregate data across groups of individuals,” but courts and juries are tasked with deciding the outcome of a case by determining whether a specific defendant harmed their fetus when they ingested cocaine. In this regard, criminal prosecutions are intended to be fact-specific to each case at issue.

This Note contends that courts can accurately assess the scientific validity of prenatal substance use charges by adopting a mode of analysis called the G2i framework, which has been proposed by academics for courts to understand causation in toxic tort cases. The G2i framework aims to mitigate challenges that arise when decision-makers rely on group data (G) to make decisions about individuals (i). The G2i framework addresses these challenges head-on, providing three steps for courts to follow. Under this framework, courts would analyze prenatal substance use charges by: 1) correctly diagnosing the condition; 2) determining whether the perceived cause of prenatal substance use can possibly cause the condition, known as “ruling in” or establishing “general causation;” and 3) eliminating alternative causes, known as “ruling out” or establishing “specific causation.” Applying this framework to prenatal substance use cases would be novel and holds promise to ensure courts apply the proper level of scrutiny to scientific evidence presented in criminal cases writ large.

This Note will proceed in three parts. Part I contextualizes the criminalization of prenatal substance use, addresses the question of causation, and reviews the scientific literature concerning drug use and fetal harm. Part II reviews three statutes used to prosecute prenatal substance use, and describes how, in cases brought under those statutes, scientific evidence is currently evaluated by courts. Part III argues that courts should utilize the G2i framework to evaluate whether harm to the fetus was actually caused by prenatal substance use to a reasonable degree of confidence. As this Note will reveal, fetal harm is rarely the result of a single factor, but rather is based on a combination of factors. Applying this framework, this Note concludes that when harm to the fetus can be attributed to multiple factors—and not solely to drug use—a court cannot find beyond a reasonable doubt that a defendant caused fetal harm or death because of their drug use.

---

21 See Faigman et al., supra note 19.
I. CONTEXTUALIZING THE CRIMINALIZATION OF PRENATAL SUBSTANCE USE

The criminalization of prenatal substance use is one of many means employed by the state to police pregnancy. In fact, pregnant people’s bodies are policed to the extent of being treated as “property of the state.” In the United States, 1 in 160 pregnancies will result in a stillbirth. This may sound like a small risk, but “[m]ore babies die as a result of stillbirth than of all other causes of infant deaths combined.” Around 10 to 20% of pregnancies will end in miscarriage, though estimates are up to thirty to fifty percent when including those who miscarry prior to knowing they are pregnant; preterm birth affects roughly ten percent of infants and up to approximately fourteen percent for Black pregnancies; and about one in twelve babies, or eight percent, are born with low birth weight. These adverse

---


23 This Note often switches between the terms “pregnant people” and “pregnant women.” To clarify, this Note aims to be gender-neutral and therefore uses the term “people” rather than “women.” However, many of the sources cited by this Note refer exclusively to women. When referencing those sources, this Note adopts their gendered terminology.

24 Katha Pollitt, The long fight for reproductive rights is only getting harder, WASH. POST (May 13, 2020, 6:00 AM), https://www.washingtonpost.com/outlook/the-long-fight-for-reproductive-rights-is-only-getting-harder/2020/05/12/2fda9f2a-8326-11ea-878a-86477a724bd_story.html, archived at https://perma.cc/C3NS-2LUG.


pregnancy outcomes happen for a variety of reasons that do not reflect an intent to terminate or harm the pregnancy. Yet, pregnant people are often criminalized for common situations that may result in harm to the fetus. In all of these cases, the state imposes criminal penalties for a person’s behavior, decisions, or circumstances during pregnancy.

Unfortunately, there is limited data available on arrests for prenatal substance use. This leaves a scattershot view, but the available data reveals that arrests for prenatal substance use are pervasive. One national study found that between 1973 and 2005, 348 women were arrested for drug use during pregnancy. Another study determined that in Alabama alone, there have been around 500 prosecutions of new or expecting mothers since 2006. Those prosecuted for prenatal substance use have faced a variety of charges, from child abuse or endangerment to homicide in certain cases involving stillbirth, such as Rennie Gibbs. The charges also concern a range of drugs: cocaine, methamphetamine, marijuana, opiates, and valium, among others. This Note will focus on prenatal cocaine use due to its historical overrepresentation in arrests for prenatal substance use and its relation to

---

30 As two examples, Christine Taylor was charged with attempted feticide for tripping while pregnant. See Michele Goodwin, Fetal Protection Laws: Moral Panic and the New Constitutional Battlefront, 102 CALIF. L. REV. 781, 806–08 (2014); Melissa Rowland was charged with murder for refusing a Cesarean delivery. See generally Howard Minkoff & Lynn M. Paltrow, Melissa Rowland and the Rights of Pregnant Women, 104 OBSTETRICS & GYNECOLOGY 1234 (2004).
31 It is impossible to determine the full extent of the criminalization of prenatal substance abuse mainly due to the lack of comprehensive data. We therefore must draw conclusions from the data that is available.
33 See Nina Martin, Take a Valium, Lose Your Kid, Go to Jail, PROPUBLICA (Sept. 23, 2015), https://www.propublica.org/article/when-the-womb-is-a-crime-scene, archived at https://perma.cc/ZF3U-QDB3. This count begins in 2006 because it is the year Alabama enacted its chemical endangerment law.
34 Child abuse and endangerment charges are the most common charges brought. See Paltrow & Flavin, supra note 32, at 311 (stating that 35% of documented cases brought under existing statutes, 204 cases were concerned abuse/endangerment and 48 cases concerned homicide); see also Angelotta & Applebaum, supra note 15, at 194 (demonstrating a similar distribution).
35 Paltrow & Flavin, supra note 32, at 310.
36 Id.
37 Id.
38 Id.
39 See Martin, supra note 33.
40 See Paltrow & Flavin, supra note 32, at 310 (stating that of 348 documented cases, 282 cases were based on cocaine ingestion); See also Angelotta & Applebaum, supra note 15, at 194 (demonstrating that cases concerning cocaine were the most represented). As described in the next section, the War on Drugs placed specific emphasis on crack use and inspired the “crack baby” panic described herein. Cocaine use therefore has played a specific role in the historic criminalization and policing of Black people. For more information on the way the War on Drugs was used to police pregnancy, see National Advocates for Pregnant Women, Policing Pregnancy Through the War on Drugs, YOUTUBE (Apr. 26, 2021), https://www.youtube.com/watch?v=-2MCKQmIlI0, archived at https://perma.cc/PS6G-3Z2R.
state control of Black bodies; however, the arguments made herein apply similarly to other substances.41

A. The Historical Focus On Black People Using Drugs: A Review Of Systemic Oppression

Drug use has been criminalized as a result of systemic oppression and racism. Drug use during pregnancy, and outside of pregnancy for that matter, does not reflect any individual or group moral failing. Rather, it is a symptom of larger forces targeting marginalized and poor communities. The War on Drugs and mass incarceration embody such forces.42 By identifying, grappling with, and pushing against these unjust systemic forces, it is possible to shift the false narrative that marginalized and poor communities disproportionately use drugs and illustrate that drug use can be a symptom of systemic oppression.

Government actors have long created and enforced racist policies that criminalize marginalized and poor communities. For example, in 1971, then-President Richard Nixon announced the War on Drugs. He declared that “America’s public enemy number one . . . is drug abuse. In order to fight and defeat this enemy, it is necessary to wage a new, all-out offensive.”43 Many argue that “the War on Drugs” failed, pointing to the increase in drug use,44 while others argue that it functioned exactly according to its actual plan: to criminalize Black people for using drugs, and to incarcerate them for it.45 Nixon’s domestic policy advisor, John Ehrlichman, admitted in a 1994 interview that the War on Drugs was entirely motivated by animus toward Black people and the anti-war Left:

41 It is similarly argued that, like the arguments made herein regarding cocaine, none of these substances used to criminalize pregnancy are teratogens. See Pregnancy and Drug and Alcohol Use, NAT’L ADVOCATES FOR PREGNANT WOMEN, https://www.nationaladvocatesforpregnantwomen.org/issues/pregnancy-and-drug-and-alcohol-use/, archived at https://perma.cc/LYA5-9SP6.


“We knew we couldn’t make it illegal to be either against the war or black, but by getting the public to associate the hippies with marijuana and blacks with heroin, and then criminalizing them both heavily, we could disrupt those communities. We could arrest their leaders, raid their homes, break up their meetings, and vilify them night after night on the evening news. Did we know we were lying about the drugs? Of course we did.”

If the goal, as stated here, was to increase incarceration for Black Americans, then the War on Drugs has been a success. Between 1972 and 2009, the U.S. prison population grew nearly 700%. Moreover, Black Americans are incarcerated more than five times the rate of white Americans, according to 2018 data from the Bureau of Justice Statistics.

The story of the War on Drugs is largely one of racially disproportionate incarceration. Take, for example, the sentencing disparity between convictions for possessing crack and powder cocaine, both of which are forms of cocaine. The Omnibus Anti-Drug Abuse Act of 1988 created a five-year mandatory minimum and a twenty-year maximum sentence for possessing five or more grams of crack cocaine. In contrast, the penalty for possession of any amount of powder cocaine was a maximum sentence of one year in prison. The U.S. Sentencing Commission found that, among federal convictions for crack cocaine distribution in 1993, 88.3% were Black people and 4.1% were white people. In contrast, the racial breakdown for powder cocaine distribution offenses in 1993 was 32% white people and 27.4% Black people. The prioritization of policing crack cocaine use was therefore purposeful: in the 1990s, “[p]ublic opinion tend[ed] to associate the country’s drug crisis, specifically its perceived ‘crack problem,’ with Black, inner-city neighborhoods.”

---


48 See E. Ann Carson, *Prisoners in 2018*, BUREAU OF JUSTICE STATISTICS, 1, 9 (April 2020), https://bjs.ojp.gov/content/pub/pdf/p18.pdf, archived at https://perma.cc/NZZ2-KBCK (finding that in 2018, the imprisonment rate of Black U.S. residents was 1,134 per 100,000 compared to 218 per 100,000 for white U.S. residents, yielding a rate roughly 520% higher for Black people).


51 Id.

52 Id. at 38.
vey from the same time period by the National Institute on Drug Abuse found that the majority of those reporting powder cocaine or crack use were white people.

The War on Drugs oppresses marginalized communities, and then faults these communities for the outcomes of this oppression. As recently as 2016, “Black people were still getting arrested at more than twice the rate that white people were for cocaine offenses.” The 2015 National Survey on Drug Use and Health found similar rates of cocaine use among Black and white populations for lifetime use, use in the past year, and use in the past month. For lifetime use specifically, 16.8% of white respondents reported cocaine use compared to 10.3% of Black respondents.

The prosecution of pregnant people for prenatal substance use is an outgrowth of the War on Drugs, and specifically the “crack baby” panic that this “war” produced. The panic was instigated by a study conducted by Dr. Ira Chasnoff, which was based on a sample size of only 23 babies and lacked any control group. Dr. Chasnoff concluded that in utero crack exposure caused some babies to be born with brain damage. The study incited political and media hysteria. A “consensus of narratives among journalists” arose “prophes[y]ing] that ‘crack babies’ would grow up to be ‘joyless,’ their futures would be ‘bleak,’ and schools were destined to be overwhelmed by their presence in the classroom.” A former director of the National Center on Child Abuse termed these children the “bio-underclass.” The scientific and media focus on crack cocaine use, as opposed to powder cocaine, was intentional: it fed into the War on Drugs narrative that Black people are the

53 National Household Survey on Drug Abuse (NHSDA) is a self-report survey that produces estimates of drug use among household members aged twelve years and older. Id. at 32.


55 This societal response can be contrasted with that of the opioid epidemic. The opioid epidemic most heavily impacts white people. Looking at opioid overdose deaths between 1997 and 2017, “approximately 323,939 total deaths were attributed to White, Non-Hispanics, while 75,291 were attributed to all other ethnicities.” Jasmine Drake, Creaque Charles, Jennifer W. Bourgeois, Elycia S. Daniel, & Melissa Kwende, Exploring the impact of the opioid epidemic in Black and Hispanic communities in the United States, 6 Drug, Science, Pol’y and L. 1, 1 (2020). The opioid crisis “has highlighted the need to treat drug addiction as a public health issue, [while] that framing has not extended to other highly criminalized drugs.” Race and the War on Drugs, Nat’l Ass’n of Criminal Defense Lawyers (May 21, 2021), https://www.nacdl.org/Content/Race-and-the-War-on-Drugs, archived at https://perma.cc/27WY-FY9R.

56 Race and the War on Drugs, supra note 55.


58 Id.

59 See Goodwin, supra note 30, at 845.

60 See id. at 846.

61 See id.

62 Goodwin, supra note 22, at 18.

63 Roberts, supra note 15, at 949.
only ones who use crack cocaine. “[T]he media left the impression that the pregnant addict is typically a Black woman. ... the pregnant crack addict was the latest embodiment of the bad Black mother.”64 This rhetoric “made brutes out of people of color.”65 Though the “crack baby” has proven to be a myth,66 its role in devaluing Black motherhood is anything but.67

Drug use during pregnancy is by no means exclusive to Black women, but they are the most criminalized for it. One study from 1990 found that though Black and white women used drugs during pregnancy at approximately the same rates,68 Black women were reported to law enforcement for drug use at ten times the rate of white women.69 What’s more, both private doctors and public health facilities have been found to be more likely to report Black women to law enforcement than white women.70 Subsequent studies have replicated these findings: Paltrow and Flavin found that 52% of those arrested for using drugs while pregnant were Black and 71% were indigent.71 They also found that Black women were 19.7% more likely to be charged with felonies for using drugs during pregnancy than white women.72 By mid-1992, 75% of prenatal substance use prosecutions were brought against women of color.73 Historically, these prosecutions have been focused on women of color. But as Michele Goodwin predicted, “fetal protection prosecutions [jumped] the so-called color line,”74 with prosecutions in Ala-

64 Id. at 950.
66 See, e.g., Lynn M. Paltrow & Kathrine D. Jack, Pregnant Women, Junk Science, and Zealous Defense, 34 CHAMPION 30, 31 (2010) (“Throughout almost 20 years of research, none of us has identified a recognizable condition, syndrome or disorder that should be termed ‘crack baby.’”).
67 See Roberts, supra note 15.
68 See Ira J. Chasnoff, Harvey J. Landress, & Mark E. Barrett, The Prevalence of Illicit Drug or Alcohol Use During Pregnancy and Discrepancies in Mandatory Reporting in Pinellas County, Florida, 322 NEW ENGL. J. MED. 1202, 1204 (1990) (“[I]n the population we surveyed the frequency of positive results on toxicologic testing of urine samples obtained at the first prenatal visit was similar for white women (15.4 percent) and black women (14.1 percent).”). But see CTR. FOR BEHAVIORAL HEALTH STATISTICS AND QUALITY, SUBSTANCE USE DURING PREGNANCY VARIES BY RACE AND ETHNICITY (2010) 1, 1, https://www.samhsa.gov/data/sites/default/files/Spot062PregnantRaceEthnicity2012/Spot062PregnantRaceEthnicity2012.pdf, archived at https://perma.cc/6YDF-VZAZ (stating that 7.7% of Black women use drugs during pregnancy compared to 4.4% of white women).
69 Chasnoff, supra note 68, at 1204; This does not hold in Alabama, where 73% of chemical-endangerment defendants who were pregnant or new moms have been white. See Nina Martin & Amy Yurkanin, Special report: Alabama leads nation in turning pregnant women into felons, AL.COM (Sept. 23, 2015), https://www.al.com/news/2015/09/when_the_womb_is_a_crime_scene.html, archived at https://perma.cc/6K9S-Y9VJ.
70 See Roberts, supra note 15, at 948.
71 Paltrow & Flavin, supra note 32, at 310. This calculation is based on the data provided in Table 2.
72 See id. at 313.
73 See Roberts, supra note 15, at 938.
74 Goodwin, supra note 22, at 14.
bama centering on low-income white women.75 As such, with regard to the criminalization of prenatal substance use, “Black women were simply the euphemistic canaries in the coal mine.”76

Policy actors and the media driven sensation may be responsible for disproportionately policing drug use among Black women, but courts have played a critical role by legitimating it. No fact pattern exemplifies this quite like that in the Supreme Court case Ferguson v. City of Charleston.77 In 1988, a nurse (“Nurse Brown”) at the Medical University of South Carolina heard on the news that police in Greenville, South Carolina were arresting pregnant people using cocaine for child abuse.78 Nurse Brown discussed what she heard on the news with the hospital’s general counsel, who then reached out to the City Solicitor to offer the hospital’s cooperation in prosecuting mothers who tested positive for cocaine at the time that their children were born.79 Nurse Brown was “integral to [the policy’s] everyday implementation” within the hospital.80 Medical staff tested mothers’ urine to screen for drugs without informing them or obtaining a warrant.81 When cocaine use was detected after a baby’s birth,82 the hospital notified police “without delay” and the patient was “promptly arrested.”83 Some women were arrested “while still bleeding, weak and in pain from having just given birth.”84 As a result of Nurse Brown’s intervention and in a clear indication of racial bias, twenty-nine of the thirty women arrested were Black.85 Nurse Brown admitted to calling the Solicitor’s office to “request another ‘chance’ on behalf of a white patient who should have been arrested under the Policy’s terms.”86 And as to the one white woman arrested, there is evidence to indicate that the arrest was also motivated by racial bias. Nurse Brown noted on

75 See Katherine Koster, Alabama’s Chemical Endangerment Laws: Where the War on Drugs Meets the War on Women, HUFFPOST (Sep. 25, 2015 at 12:35 PM), https://www.huffpost.com/entry/alabamas-chemical-endange_b_8193196, archived at https://perma.cc/8RMN-WVXP. (“Nationally, research indicates that women of color are disproportionately criminalized or subject to DCFS intervention for drug use during pregnancy. In Alabama, however, white-majority counties have used the chemical endangerment act to prosecute pregnant women most frequently.”)
76 Goodwin, supra note 22, at 14.
78 Id. at 70.
79 See id. at 70–71.
81 See Ferguson, 532 U.S. at 70.
83 If a mother was screened for drug use prior to birth, and tested positive, “police were to be notified (and the patient arrested) “only if the patient tested positive for cocaine a second time or if she missed an appointment with a substance abuse counselor.” Ferguson, 532 U.S. at 72.
84 Id.
85 Goodwin, supra note 30, at 826.
86 Id. at 825.
87 Id. at 826, n.255.
her medical chart: “Patient live[s] with . . . a Negro” and stated in court that she believed interracial relationships were against “God’s way.”

Relatedly, Nurse Brown “raised the option of sterilization for [B]lack women . . . but not for white women.”

The Court notably failed to touch on the racism underlying both the policy and its application, even though Ferguson’s attorneys briefed the Court on the issue of overt racial discrimination. In their brief, the appellants argued that the discretion granted to the hospital through its search policy “resulted in a protocol that disproportionately targeted indigent, African-American women for search and then arrest.”

The brief also noted that the hospital’s policy was designed “to focus on cocaine to the exclusion of other illegal or legal drugs that could harm the fetus.” Disregarding these arguments, the Court focused instead on the “pervasive involvement of law enforcement” in the planning and execution of hospital procedures, holding that the drug testing scheme violated the Fourth Amendment. In failing to acknowledge this clear targeting of Black mothers, though, the Court implicitly condoned it.

B. The Relationship Between Cocaine Ingestion And Fetal Harm: An Evaluation Of The Evidence

As demonstrated in Ferguson v. City of Charleston, the extensive media coverage of the “crack baby” epidemic incited widespread fear of cocaine-exposed babies and their mothers. But the actual relationship between cocaine ingestion and fetal health is widely contested. In 2004, “virtually every expert” in the field of prenatal drug exposure joined an open letter lambasting the “crack baby” as a myth.

---

80 Id. at 825-26.
81 Id. at 826.
83 Id. at 11.
84 Ferguson, 532 U.S. at 85.
85 See generally Paltrow & Jack, supra note 66.
86 See id. at 30 (“For nearly two decades, popular media was full of highly prejudicial and often inaccurate information about the effects of in utero cocaine exposure.”); accord Mishka Terplan & Tricia Wright, The Effects of Cocaine and Amphetamine Use During Pregnancy on the Newborn: Myth Versus Reality, 30 J. ADDICTIVE DISEASES 1, 2 (2010). As described above, the “crack baby” panic was a mechanism to justify the war on drug users, portraying drug use as an individual moral failing. This media-induced panic also served another, larger purpose: to advance the anti-abortion movement by creating a fetal personhood narrative, casting the pregnant drug user as “selfish[ly] negligen[t]” or having hostility toward the “innocent” fetus. See Wendy Chavkin, Cocaine and Pregnancy—Time to Look at the Evidence, 285 J. AM. MED. ASS’N. 1626, 1626 (2001).
87 See Paltrow & Jack, supra note 66 (“Throughout almost 20 years of research, none of us has identified a recognizable condition, syndrome or disorder that should be termed ‘crack baby.’”).
Empirically, the risks of prenatal cocaine ingestion are not nearly as severe or long-lasting as the media has portrayed them to be. A cursory review will yield an abundance of web pages—including hospitals, nonprofits, and medical media pages—listing the dangers associated with fetal cocaine exposure. But a deeper look into scientific studies reveals a more nuanced reality. In general, studies show that cocaine is a weak teratogen in humans, if one at all. For example, studies show that cocaine use during pregnancy can lead to babies being born smaller and to an increased rate of

802 Harvard Civil Rights-Civil Liberties Law Review [Vol. 57

...
premature births.99 However, the overwhelming majority of babies with mothers who ingested cocaine during pregnancy are not born prematurely,100 and those who are born smaller or prematurely appear to rapidly make up the growth gap.101 Thus, the effects of cocaine use on fetal health generally disappear after a period of months.102 In an open letter debunking the crack baby myth, experts in fetal health stated that “[s]ome of our published research finds subtle effects of prenatal cocaine exposure in selected developmental domains, while other of our research publications do not.”103 In an op-ed, David C. Lewis, a pioneer in addiction medicine, writes that “a comprehensive research review shows no consistent negative association between maternal cocaine exposure and children’s physical growth, developmental test scores, or performance on receptive and expressive language tests. Furthermore, standardized parent and teacher reports of student behavior showed no independent effects from maternal cocaine use.”104

The relationship between prenatal cocaine exposure and fetal death105 similarly rests on extremely tenuous ground. The leading study on the relationship between cocaine ingestion and miscarriage106 found that, among the women who experienced miscarriage, 28.9% used cocaine.107 However, cocaine was also used in 20.5% of the women who did not miscarry.108 An

99 See id.; but see Terplan & Wright, supra note 94 (“[One study] found no effect of birth defects on congenital malformations or birth weight.”).
102 See COHEN, supra note 98; see also Edward Z. Tronick & Marjorie Beeghly, Prenatal Cocaine Exposure, Child Development, and the Compromising Effects of Cumulative Risk, 26 CLIN. PERINATOLOGY 151, 153 (1999) (“The literature to date provides no consistent evidence for dose related cocaine effects on children’s developmental outcomes beyond the first year of life.”).
105 Fetal death refers to miscarriage or stillbirth.
106 Referred to in the study as “spontaneous abortion.” Miscarriage is when an embryo or fetus dies before the twentieth week of pregnancy. PLANNED PARENTHOOD, What is a Miscarriage?, https://www.plannedparenthood.org/learn/pregnancy/miscarriage, archived at https://perma.cc/U7AC-LA5K.
107 Roberta B. Ness, et al., Cocaine and Tobacco Use and the Risk of Spontaneous Abortion, 340 NEW ENGLAND J. MED., 333, 335 (1999). This study identified cocaine use through both a hair and a urine analysis. The numbers reflected in this note are from the hair analysis because “[h]air analysis is an extremely sensitive marker of cocaine use over a period of weeks or months, depending on the length of hair analyzed. Positive results may have been more strongly related to spontaneous abortion than positive urine analysis results because hair analysis reflects the patterns of use over a period of several months” whereas “urine tests detect only recent use of cocaine (use within 72 hours of testing), so that intermittent use may not be detected.” Id. at 338 (internal citations omitted).
108 Id. at 335.
editorial in the New England Journal of Medicine concluded that “[t]hese results do not make an impressive case for cocaine as a cause of spontaneous abortion.” Another scholar characterized this finding as “suggesting that cocaine was not a causative factor in [miscarriages].”

Building on the doubt that cocaine causes fetal harm, other systemic forces, like poverty and racism, are associated with the harms cocaine is alleged to cause. The living conditions that people in poverty are subjected to have been shown to be harmful to fetal development. To begin, poverty

---

109 James L. Mills, Cocaine, Smoking, and Spontaneous Abortion, 340 NEW ENGLAND J. MED. 380, 380 (Feb. 4, 1999). This scholar continued, writing that “[e]ven if we ignore the fact that the P values probably should have been adjusted for multiple comparisons, the result of the hair analysis is of borderline statistical significance. The lack of corroboration from the urine tests suggests that the result of the hair analysis could be a chance finding.” Id.

110 COHEN, supra note 98, at 155. There is one major adverse event significantly associated with cocaine, and that is placental abruption. This can cause fetal death. See Antonio Addis, et al., Fetal effects of cocaine: an updated meta-analysis, 15 REPRODUCTIVE TOXICOLOGY 341, 354 (2001). This study also listed premature rupture of membranes as having a statistically significant relationship, but many studies report finding no or very weak relationship. See e.g., Robert Andres, The impact of tobacco and cocaine use on preterm premature rupture of the membranes (pPROM), 189 AM. J. OBSTETRICS AND GYNECOLOGY S131, S131 (2003). But unlike a usual miscarriage or stillbirth, a placental abruption is an event that a doctor can clearly identify and work to treat. It is also significantly rarer. This distinguishes it from the cases discussed in this note, which generally consist of stillbirths and miscarriages. Additionally, the association between placental abruption and cocaine is weaker than its association with smoking cigarettes or having high blood pressure, so it is not a unique reaction to cocaine ingestion. See Healthwise Staff, Placenta Abruptio, MICHIGAN MEDICINE, UNIV. OF MICHIGAN, https://www.uofmhealth.org/health-library/hw180726, archived at https://perma.cc/GX2A-KZXD.

It is also important to note that there is some research that finds a correlation between cocaine use and fetal death. See generally Elke H. Roland & Joseph J. Volpe, Effect of Maternal Cocaine Use on the Fetus and Newborn: Review of the Literature, 15 PEDIATRIC NEUROSCIENCE 88 (1989) (finding that cocaine use during pregnancy may be associated with increased perinatal morbidity and mortality); Lynn Ryan, Saundra Ehrlich, & Lorettta Finnegan, Cocaine use in pregnancy: Effects on the fetus and newborn, 9 NEUROTOXICOLOGY AND TERATOLOGY 295 (1987) (concluding that cocaine use during pregnancy increases risk of miscarriage and fetal death, as well as lower birth weight and smaller size); Augustine J. Kposowa & Pamela J. Preston, The Effect Of Substance Use In Pregnancy On The Risk Of Infant Mortality, 34 SOCIOLOGICAL FOCUS 55 (2001) (finding higher fetal death rate among a 1988 birth cohort for those who used crack and cocaine during pregnancy); Claudia Holzman & Nigel Paneth, Maternal Cocaine Use During Pregnancy and Perinatal Outcomes, 16 EPIDEMIOLOGY REV. 315 (1994) (finding that cocaine use during pregnancy is associated with impaired fetal growth, but less consistently associated with preterm delivery and congenital anomalies).

However, these studies tend to be older and are often contradicted in more recent research. See, e.g., Lawrence M. Berger & Jane Waldfogel, Prenatal Cocaine Exposure: Long-Run Effects and Policy Implications, 74 SOCIAL SERVICE REV. 28, 29–31 (2000) (“The impact of prenatal cocaine exposure on infants has been extensively studied. However, recent reviews of the literature show that much of the research to date has been found to be contradictory, unreliable, biased, or inconclusive . . . . many of the outcomes that were once attributed solely to prenatal exposure to crack cocaine have recently been linked to both confounding variables and methodological shortcomings in the studies themselves. It now appears that previous studies have tended to overestimate the effects of prenatal exposure on newborns as well as its long-term effects on children’s growth and development.”).
is associated, among other things, with lack of access to prenatal care, lack of access to nutritious foods, increased stress, increased lead exposure,
increased likelihood of eviction, and poor quality housing, all of which are known to cause harm to a pregnancy and impact the fetus. As an example:

10.3389/fpubh.2020.00453/full#:~:text=poverty%20leads%20to%20financial%20constraints, but%20nutritional%20quality%20becomes%20compromised, archived at https://perma.cc/P738-GVMK (“Poverty leads to financial constraints that in turn lead to the consumption of cheap, high-energy staple foods, primarily carbohydrates, and fats rather than nutritionally dense food. Through the consumption of carbohydrates and fats, energy levels spike; but nutritional quality becomes compromised. The consequence of this is reduced nutritional quality and nutrient deficiencies.”).

116 See generally Bethany M. Wood & Catherine Cubbin, Neighborhood Poverty in Combination with Older Housing Is Associated with Adverse Birth Outcomes: A Study on Ubiquitous Lead Risk among 1 Million Births in Texas, 19 INT’L. J. ENV’T. RES. PUB. HEALTH 1578, 1578–79 (2022) (“[F]etal exposure to the heavy metal lead (Pb), a known toxicant, precipitates several adverse birth outcomes, including preterm labor and small-for-gestational-age births, . . . Currently, the main source of ubiquitous lead exposure is through inhalation or ingestion of lead-based paint and dust contaminated by lead in housing, followed by the presence of Pb in contaminated water.”); Centres for Disease Control and Prevention, Picture of America Report: Reproductive Outcomes Fact Sheet, https://www.cdc.gov/pictureofamerica/pdfs/picture_of_america_reproductive_outcomes.pdf, archived at https://perma.cc/96DL-W5DP (“Maternal exposure to lead is associated with preterm birth. Other adverse birth outcomes that may be linked with maternal or paternal lead exposure include low birthweight and spontaneous fetal loss.”).

2022] Risky Business 807

ple, lack of prenatal care is associated with premature delivery, fetal growth restriction, low birth weight, preeclampsia, congenital malformations, stillbirth, maternal mortality, and infant mortality. Some social science researchers argue that reproductive outcomes are rooted in social and economic inequalities. One empirical study of neighborhood context and its effect on reproductive health concludes that individual level characteristics fail to account for the gaps in adverse birth outcomes between racial and social classes. It summarized:

The availability of such [goods and services, such as access to quality health care, grocery stores, recreational facilities, and police and fire protection,] is likely to be affected by the degree of political organization that influences the residents’ ability to demand public services and recruit private service providers to their neighborhoods. Poor public and private services may have a direct and indirect impact on an individual’s health by making residents more susceptible to . . . injuries. Finally, the quality of the physical environment, which includes exposure to toxicants, noise and air

cause preterm labour, 68 OCCUPATIONAL AND ENVTL. MEDICINE 231 (2010); L.L. Jelliffe-Pawlowski, et al., Effect of magnitude and timing of maternal pregnancy blood lead (Pb) levels on birth outcomes, 26 J. PERINATOLOGY 154 (2006). Similarly, increased likelihood of evictions is linked to adverse birth outcomes. See, e.g., Gracie Himmelstein & Matthew Desmond, Association of Eviction With Adverse Birth Outcomes Among Women in Georgia, 2000 to 2016, 175 JAMA PEDIATRICS 494, 497–98 (2021), https://jamanetwork.com/journals/jamapediatrics/fullarticle/2776776, archived at https://perma.cc/C6D8-MF6X (“Eviction actions during pregnancy, as opposed to eviction actions at any other time, were associated with worse birth outcomes, including reduced birth weight, shorter gestation, increased probability of being classified as LBW or premature, and a trend toward increased infant mortality.”). Finally, poor quality housing is associated with adverse birth outcomes. See generally Wood & Cubbin, supra note 116.

120 See Cristiane Quadrado da Rosa, Denise Silva da Silveira, & Juvenal Soares Dias da Costa, Factors associated with lack of prenatal care in a large municipality, 48 REVISTA DE SAUDE PÚBLICA 977, 980–81 (2014) (“The deprivation of prenatal care can lead to premature pregnancy, intrauterine growth retardation, low weight at birth, and maternal and child mortality as a result of infections in the perinatal and postnatal periods.”); Andrew Smith & Erin Bassett-Novoa, Late Presentation to Prenatal Care, 92 AM. FAM. PHYSICIAN 391, 395 (2015) (“Late presentation to prenatal care has also been associated with increased rates of preterm delivery, low birth weight, and congenital malformations, compared with initiation of care in the first trimester.”); Min Kyoung Kim, et al., Socioeconomic status can affect pregnancy outcomes and complications, even with a universal healthcare system, 17 IJL J. FOR EQUITY IN HEALTH 2, 3 (2018) (“Inadequate prenatal care is associated with poor obstetric outcomes, including preterm delivery, preeclampsia, and stillbirth, and women with low SES are less likely to receive prenatal care. In fact, the risk of preterm delivery, preeclampsia, and gestational diabetes increases with both inadequate prenatal care and low SES.”).

121 See, e.g., Culhane & Elo, supra note 112, at S22.

122 Neighborhoods are often chosen to study the relationship between poverty and adverse birth outcomes because economically disadvantaged areas generally have lower access to nutritious food, employment, education, high-quality housing, and political power, in addition to increased exposure to violence, housing instability, toxicants, and stress. See Cubbin et al., supra note 112, at 2; Culhane & Elo, supra note 112, at S23; Roberts, supra note 112, at 600.
pollution, and quality of the housing stock and public space, could have direct effects on health.\textsuperscript{123}

Studies such as this document that poverty, neighborhood deprivation of services, or socioeconomic status, have a significant association with adverse birth outcomes.\textsuperscript{124} The adverse birth outcomes include low-birth weight, preterm birth, and stillbirth.\textsuperscript{125} Pregnant people of lower socioeconomic status also face increased risk of miscarriage.\textsuperscript{126} The studies that focus on socioeconomic status and neighborhood identify an even higher prevalence of adverse birth outcomes among pregnant people of color. Black people’s pregnancies have at least twice the rate of low-birth weight babies,\textsuperscript{127} three times as likely to be very low birth weight,\textsuperscript{128} and twice as likely the rate of preterm births.\textsuperscript{129} These statistics account for socioeconomic status. In general, Black mothers experience stillbirth at twice the rate of white or Hispanic mothers,\textsuperscript{130} are at increased risk for preterm birth and low birth weight,\textsuperscript{131} are nearly twice as likely to miscarry after ten weeks of pregnancy,\textsuperscript{132} and are three to four times more likely to die from pregnancy-related complications than white women.\textsuperscript{133} Race and socioeconomic status,
together and independently, are associated with the same harms often attributed to cocaine.

In addition, those who argue for criminal sanctions on pregnant people using substances, out of concern for the fetus, ignore countless other environmental factors that produce the same forms of fetal harm. If the motivation to criminalize was guided by genuine public health concern, other agents causing harm to fetuses would be similarly criminalized or more regulated. Studies have shown that exposure to sulfur dioxide—80% of which is created by human-produced fossil fuel combustion—is directly correlated with low birth weight and preterm labor. Yet, the industries responsible for much of the sulfur dioxide production are not prosecuted for harming developing fetuses. Similarly, high levels of lead ingestion are associated with preterm birth and miscarriage. In Flint, Michigan, more than 40% of water samples were measured to be above a level of lead that researchers considered an indication of a “very serious problem.” While protests about water quality began in 2014, no criminal indictments related to the crisis were issued until 2021, and no charges were issued for fetal harm. Finally, several studies have linked tear gas, a chemical compound banned in warfare by the Geneva Convention, to miscarriages or fetal harm. In 2020, when an uprising of peaceful protests in response to racist police killings and in support of Black lives was met with police firing tear gas on protestors, there was no outcry by the pro-life movement. There also

---

have been no criminal prosecutions for the use of tear gas, even though the potential for harm to reproductive capacity and fetal development as a result of exposure to these chemical weapons has been known for decades.\textsuperscript{143} The same impacts commonly, and often inaccurately, associated with gestational cocaine ingestion are found in the situations listed above. Yet these instances of fetal harm are not prosecuted, or in many cases, not even illegal.\textsuperscript{144} There are many environmental factors that impact fetal development, but the law has not been used to address those. While I do not believe that citing fetal harm is a useful means to create more environmentally friendly laws, it is quite damning that fetal harm becomes a concern almost solely in the context of drug use.

Because pregnant people are exposed to a variety of potentially harmful conditions, the integral question regarding the criminalization of prenatal cocaine use is the relative contribution of cocaine, compared with other factors contributing to adverse pregnancy outcomes.\textsuperscript{145} In other words, the question is: but for the drug use, would the fetus be harmed? Researchers studying children under the age of six found that ultimately, “there is no convincing evidence that prenatal cocaine exposure is associated with any developmental toxicity different in severity, scope, or kind from the sequelae of multiple other risk factors. Many findings once thought to be specific effects of in utero cocaine exposure are correlated with other factors.”\textsuperscript{146} A 24-year-long longitudinal study conducted by Dr. Hallam Hurt, a neonatologist at the Children’s Hospital of Philadelphia, further found that “poverty is more influential on child outcomes than gestational cocaine exposure.”\textsuperscript{147}

\textsuperscript{142} See id.

\textsuperscript{143} For example, an article in the Washington Post from 1988 alleged that Israeli use of tear gas caused miscarriages when deployed at an Arab refugee camp. See Glenn Frankel, \textit{Israel’s Use of Tear Gas Scrutinized}, \textit{WASH. POST} (May 31, 1988), https://www.washingtonpost.com/archive/politics/1988/05/31/israels-use-of-tear-gas-scrutinized/14445a82-d298-4324-82a6-4e4ee000c213, archived at perma.cc/Y93Q-DDGP (“[T]hese sources contend the weight of circumstantial evidence clearly indicates that tear gas is at least a significant contributing factor in deaths and miscarriages among a refugee camp population . . .”).

\textsuperscript{144} It is also important to note that all of these threats are forcibly imposed on pregnant people by external sources, such as industries or police.

\textsuperscript{145} See generally Snodgrass, supra note 97

\textsuperscript{146} Frank et al., supra note 97, at 1621–24; see also Hurt et al., supra note 97, at 339 (“[W]e found no evidence of impaired [neurocognitive] function caused by gestational cocaine exposure, despite the fact that our sample size was adequate to detect a statistically and clinically significant difference . . . Our results show a strong relation between early home environment and later [neurocognitive] outcome.”).

II. CRIMINALIZATION OF PRENATAL SUBSTANCE USE AND RELEVANT STATUTORY PROVISIONS

When discussing prenatal substance use cases, it is important to analyze the statute under which the charge is brought to understand the required showing of guilt. Some charges are brought under laws that specifically target fetal harm, while others are brought under traditional homicide laws. Regardless, the most important distinction for the purpose of this Note is whether these laws require a showing of actual harm or risk of harm, or if they criminalize the act of ingesting drugs during pregnancy alone.

To illustrate this distinction, consider the difference between requirements to convict for a DUI charge versus a homicide charge. A DUI conviction requires proof of an act that could cause harm, even if it did not, whereas a homicide conviction requires proof of an act that actually caused death. In Oklahoma, as an example, the DUI provision states: “it is unlawful and punishable . . . for any person to drive . . . who . . . has a blood or breath alcohol concentration . . . of eight-hundredths (0.08) or more at the time of a test of such person’s blood or breath.”\(^\text{148}\) A conviction for a DUI offense is only concerned with whether the blood alcohol content is above a threshold level. In order to be convicted, a person need not harm another person; the mere fact of driving while drunk is punishable. In contrast, Oklahoma notes that, with regard to manslaughter, no person can be convicted “unless the death of the person alleged to have been killed and the fact of the killing by the accused are each established as independent facts beyond a reasonable doubt.”\(^\text{149}\) For manslaughter, it is not sufficient to just show that a person is dead. The law states that the prosecutor must prove beyond a reasonable doubt that the accused actually killed the deceased. Applying the logic of this difference to prenatal substance use, if a statute bases criminal liability on the existence of drugs present in a fetus, the proof needed for conviction functions more like a DUI conviction; but if it requires that the fetus suffer harm or be placed at a significant risk of harm, the proof needed for conviction functions more like that required for a homicide conviction.

Despite the important differences between these two theories of criminal liability, the distinction is often neglected in the context of prenatal substance use. Take, as one example, the case of Brittney Poolaw, a Comanche Nation Native woman who was 19-years-old and nearly four months pregnant when she had a miscarriage.\(^\text{150}\) Upon arriving at the hospital, she in-

\(^{148}\) OKLA. STAT. ANN. tit. 47, § 11-902 (West 2020).
\(^{149}\) OKLA. STAT. ANN. tit. 21, § 693 (West) (emphasis added).
\(^{150}\) See Megan Carpentier, Native American Woman In Oklahoma Convicted Of Manslaughter Over Miscarriage, OXYGEN (Oct. 15, 2021), https://www.oxygen.com/crime-news/brtneypoolaw-convicted-of-manslaughter-over-miscarriage-in-oklahoma, archived at perma.cc/R7CA-H7E2. Similar to Black women, Native women disproportionately exist in poverty, have poor access to health care, including prenatal care, and suffer from systemic racism in medicine, causing poor pregnancy outcomes. See id.
formed doctors that she had ingested both marijuana and methamphetamine during pregnancy; however, tests also identified evidence of a "congenital abnormality, placental abruption and chorioamnionitis."\(^{151}\) On their own, the abnormality, abruption, or chorioamnionitis could end a pregnancy and even prove fatal to the pregnant person.\(^{152}\) The Oklahoma manslaughter statute requires a showing of causality, as discussed above, yet the prosecution admitted that there was no way to know with certainty that drug use caused Ms. Poolaw’s miscarriage.\(^{153}\) Even though the state’s manslaughter statute requires the prosecution to prove that her actions killed the fetus, Poolaw was still convicted of first-degree manslaughter, due to her illicit drug use, after only three hours of jury deliberation.\(^{154}\) She was sentenced to four years in prison.\(^{155}\) In Oklahoma, Brittany Poolaw’s case is not an isolated one; prosecutions are increasingly being brought against pregnant people who suffer miscarriages or stillbirths.\(^{156}\)

The reality is that prosecutions for prenatal substance use often fail to account for textual difference in statutes. Some require proof of causal harm and others require only a showing that the act occurred. But it is vital to consider the statutory requirements, as they impact the evidentiary requirements and the analytical obligations of a given court. These distinctions are also important as they limit the applicability of the proposed framework, as explained below. The G2i framework, described in depth later in this Note, can only be applied where a statute imputes a requirement that any harm suffered be the direct result of drug use during pregnancy.

A. Statutes Under Which Prenatal Substance Use Is Charged

Statutes criminalizing fetal harm differ across states. Though pregnant people have been arrested in nearly every U.S. state,\(^{157}\) three states stand out for their aggressive use of prenatal substance use statutes in arresting and

\(^{151}\) Id.

\(^{152}\) Id.

\(^{153}\) See Kassie McClung and Brianna Bailey, She was charged with manslaughter after a miscarriage. Cases like hers are becoming more common in Oklahoma., The NORMAN TRANSCRIPT (Jan. 18, 2022), https://www.normantranscript.com/news/she-was-charged-with-manslaughter-after-a-miscarriage-cases-like-hers-are-becoming-more-common/article_917d6efe-77b9-11ec-8279-97d2fc288815.html, archived at perma.cc/MA58-SDJC ("Prosecutors told the jury though witnesses couldn’t definitively say drug use caused the pregnancy loss ‘that doesn’t mean they didn’t have an idea.’"); Li Cohen, Manslaughter conviction of 21-year-old Oklahoma woman who suffered miscarriage sparks outcry, CBS News (Oct. 20, 2021), https://www.cbsnews.com/news/brittany-poolaw-manslaughter-miscarriage-pregnancy/?fbclid=IwAR1M4dia9u_e1_mbOmugYVHmKhwSp5NAnpCSC8xH8TAhIQkigMqG2mg, archived at perma.cc/FLP2-A5PJ ("[T]here was no evidence her use of the substance is what caused the miscarriage.").

\(^{154}\) See Carpentier, supra note 150.

\(^{155}\) See id.

\(^{156}\) See Carpentier, supra note 150.

prosecuting pregnant persons: Tennessee, South Carolina, and Alabama. The comparison of these three states demonstrates the different approaches states can and have taken to criminalize prenatal substance use, whether it be through enacting a law to specifically target the conduct or weaponizing existing statutes. These three approaches also show variation among the causality requirement described above.

1. State statutes requiring harm or unreasonable risk of harm to the fetus

a. Tennessee

Tennessee is the only state in the country to have enacted a law specifically criminalizing drug use during pregnancy, known as its fetal assault law. In contrast, other states have relied on pre-existing child abuse or endangerment statutes to criminalize drug use during pregnancy. Tennessee’s fetal assault law was in force between 2014 and 2016. During those two years, over 100 women were arrested. The law stated:

Nothing in this section shall preclude prosecution of a woman for assault . . . for the illegal use of a narcotic drug . . . while pregnant, if her child is born addicted to or harmed by the narcotic drug and the addiction or harm is a result of her illegal use of a narcotic drug taken while pregnant.

For the purposes of this Note, there are two key components of this statute. The first is that the child must be born addicted to the drug or harmed by the drug. The second is that the harm to the fetus was caused by prenatal substance use. These components are critical because they illustrate that the law explicitly requires a causal inference to be made between the ingestion of a substance by a pregnant person and any harm caused to the fetus. It is in this situation that prosecutors fail to present adequate evidence and courts fail to faithfully enforce statutory requirements.

158 See Lewis, supra note 14, at 189.
159 Angelotta & Applebaum, supra note 15, at 193.
160 See Lewis, supra note 14, at 193.
162 Lewis, supra note 14, at 195. This statute was additionally limited in its scope: prosecutions under the amendment could only occur if the child was born. See id.
163 Technically, a baby cannot be born “addicted” to drugs. See Paltrow & Jack, supra note 66 (“By definition, babies cannot be ‘addicted’ to crack or anything else.”).
b. South Carolina

The state of South Carolina uses a statute for “unlawful conduct toward a child” to criminalize pregnant people using drugs. In 1997, it was the first state supreme court to interpret the use of the word “child” in the statute to extend to fetuses,\(^\text{164}\) indicating that criminal laws intended to prohibit conduct toward children could also be used to prohibit that conduct as it relates to fetuses. The South Carolina law used to prosecute pregnant people using substances states:

(A) It is unlawful for a person . . . who is the parent . . . of a child . . . to:

(1) place the child at unreasonable risk of harm affecting the child’s life, physical or mental health, or safety;

(2) do or cause to be done unlawfully or maliciously any bodily harm to the child so that the life or health of the child is endangered or likely to be endangered.\(^\text{165}\)

On its face, this statute requires the prosecution to prove that the fetus was subjected to an “unreasonable risk of harm” or actual “bodily harm” for a person to be convicted of unlawful conduct toward a child. For the sake of this argument, I will assume that proving an “unreasonable risk of harm” requires demonstrating a strong causal relationship between the drug and the possible harm to the fetus. This assumption can be inferred from the statutory text because it states that it is unlawful for a parent to “place” the child in harm’s way or “do or cause to be done” any harm. It therefore connects the parental action directly to the harm.

c. Alabama

Alabama criminalizes fetal harm through its chemical endangerment law. This law was initially enacted to target parents who exposed children to methamphetamine labs,\(^\text{166}\) but within months of its passing in 2006, “prosecutors and courts began applying the law to women who exposed their embryo or fetus to controlled substances in utero.”\(^\text{167}\) Indeed, Alabama has been described as “the national capital for prosecuting women on behalf of their

\(^{164}\) See Whitner v. State, 492 S.E.2d 777, 778 (S.C. 1997). Alabama’s state supreme court was the next to do so roughly 16 years later. Rachel Suppé, Pregnancy on Trial: The Alabama Supreme Court’s Erroneous Application of Alabama Chemical Endangerment Law in Ex parte Ankrom, 7 HEALTH L. POL’Y BRIEF 49, 57 (2014) (“This Alabama Supreme Court decision [Ex parte Ankrom (2013)] makes Alabama only the second state, along with South Carolina, to hold that laws designed to protect children from exposure to drugs can be used to prosecute women for using drugs during their pregnancy.”). In this way, South Carolina became a model for states seeking to criminalize conduct during pregnancy.


\(^{167}\) See Martin, supra note 33.
newborn children.” Prosecution under this law is so zealous “that, in one instance, the district attorney had to drop a prosecution . . . after it was confirmed that the defendant was not even pregnant.” A report on this statute explained that “[a] woman can be charged with chemical endangerment from the earliest weeks of pregnancy, even if her baby is born perfectly healthy. . . . The penalties are exceptionally stiff: one to 10 years in prison if her baby suffers no ill effects, 10 to 20 years if her baby shows signs of exposure or harm and 10 to 99 years if her baby dies.” Nearly everyone charged under this statute pleads guilty.

Like South Carolina, the Alabama Supreme Court has interpreted the law to apply to unborn fetuses. The law states:

(a) A responsible person commits the crime of chemical endangerment of exposing a child to an environment in which he or she does any of the following:

(1) Knowingly, recklessly, or intentionally causes or permits a child to be exposed to, to ingest or inhale, or to have contact with a controlled substance, chemical substance, or drug paraphernalia. . . . A violation under this subdivision is a Class C felony.

(2) Violates subdivision (1) and a child suffers serious physical injury by exposure to, ingestion of, inhalation of, or contact with a controlled substance, chemical substance, or drug paraphernalia. A violation under this subdivision is a Class B felony.

169 Lewis, supra note 14, at 191.
170 Martin & Yurkanin, supra note 69.
171 See id. (“Nearly all mothers charged with chemical endangerment end up pleading guilty. It’s a condition for a pretrial diversion or drug court, with the promise of a dismissal if a woman gets clean and stays out of trouble. ‘It’s a path of almost certain safety,’ said Morgan County attorney Brian White—irresistible even if a woman believes she did nothing wrong.”).
172 Ex parte Ankrom, 152 So. 3d 397, 407 ( Ala. 2013).
816 Harvard Civil Rights-Civil Liberties Law Review [Vol. 57

(3) Violates subdivision (1) and the exposure, ingestion, inhalation, or contact results in the death of the child. A violation under this subdivision is a Class A felony.\footnote{173 ALA. CODE § 26-15-3.2 (emphasis added).}

For the Class C felony, actual harm is not required for a conviction—the prosecution need only prove that the fetus was exposed to a chemical substance.\footnote{174 The Bloomstein Firm, What you need to know about Alabama’s chemical endangerment law, https://www.thebloomstonfirm.com/what-you-need-to-know-about-alabamas-chemical-endangerment-law/#:~:text=the%20chemical%20exposure%20law%20makes,up%20to%202010%20years%20in, archived at https://perma.cc/9ZL6-PDQH (“Note that there need be no evidence of any harm to the child in order to obtain a conviction.”).} In contrast, the Class A and B felonies require evidence of actual harm to the fetus for conviction. For a Class B felony, the fetus must be exposed and harmed, but the law does not explicitly require causation (that the exposure caused the harm). The Class A felony, however, requires a causal inference to be made. Prosecution of the Class A felony requires three factors be shown: 1) the fetus was exposed; 2) it died; and 3) its death was caused by the exposure.

2. Federal prosecution of prenatal substance abuse

The criminalization of prenatal substance use was confined to state-level criminal systems until 2019, when it entered the federal courts. As such, these prosecutions are no longer limited to state prosecution, and may be increasingly federally prosecuted. In United States v. Flute,\footnote{175 United States v. Flute, 929 F.3d 584 (8th Cir. 2019).} a Native American woman gave birth to a full-term baby who died four hours after birth. Samantha Flute told doctors that she had ingested both prescription and over-the-counter medicine before arriving at the hospital. She was subsequently arrested on allegations that she killed the baby by ingesting those medications “in a grossly negligent manner.”\footnote{176 United States v. Flute, 2017 WL 11414318 (D. S.D. 2017).} She also tested positive for cocaine.\footnote{177 United States v. Flute, 929 F.3d at 586 (“Flute tested positive for cocaine and a number of prescription and over-the-counter drugs.” The court added that “she had snorted hydrocodone, which she believed to have been laced with cocaine based on the feeling it gave her.”).} Flute was charged with involuntary manslaughter. The district court dismissed the charge, holding that the Unborn Victims of Violence Act\footnote{178 18 U.S.C.A. § 1841 (West).} created a class of persons who “cannot be prosecuted under the federal criminal statutes for injury caused to an unborn child”: pregnant women, for actions with respect to their own unborn children.\footnote{179 United States v. Flute, No. 1:17-CR-10017-CBK, 2017 WL 5495170, at *3 (D.S.D. Nov. 14, 2017), rev’d and remanded, 929 F.3d 584 (8th Cir. 2019).} The Eighth Circuit Court of Appeals reversed and reinstated Flute’s indictment,\footnote{180 \textit{See generally} Flute, 929 F.3d.} holding that the baby fell within the class of victims protected by the manslaugh-
ter statute under the definition of “human being” proffered by the Born Alive Infant Protections Act. The court further held that Flute fell within the class of defendants recognized by the manslaughter statute because the law criminalizes a person killing a “human being,” which includes a child “born alive.” The court determined that the Unborn Victims of Violence Act “has no applicability or reach beyond its own provisions,” and as such, its language exempting a pregnant person with respect to their own fetus could not be used to challenge the language employed in a different statute. As such, the immunity for a pregnant person is exclusive to the offenses against “unborn children” specifically added by the Act and “does not extend to offenses against born-alive children in violation of a predicate statute.”

The case will return to the district court for trial, where the court will have to determine, inter alia, “the extent to which an illegal substance, not charged in the indictment, caused the death of the child.”

This decision is highly significant, not only because it is the first time such an issue has been ruled on by a federal circuit court, but because it signals that federal courts may be willing to pick up where state jurisprudence has left off. This prediction is bolstered by Justice Clarence Thomas’ line of questioning in Dobbs v. Jackson Women’s Health. In oral arguments on that case, which occurred on December 1, 2021, advocates argued about whether a state can enact abortion bans earlier in pregnancy than the viability line established in Planned Parenthood v. Casey. Justice Thomas “took nearly every opportunity to discuss the case of a woman who used cocaine during her pregnancy and was prosecuted under child neglect laws.” Thomas’ insistence on centering criminalization of pregnancy in oral arguments for a case pertaining to the merits of abortion bans suggests the current Court’s inclination to increase measures to criminalize pregnancy.

Further, in Flute, the Eighth Circuit interpreted the manslaughter statute so broadly that it “dramatically expand[ed] criminality to a wide range of pregnant conduct without express legislative intent.” This interpretation

181 See Flute, 929 F.3d. at 588.
182 Id. at 589–90.
184 Id. at 3.
will have far-reaching consequences for pregnant people, as “[t]he elastic criminalization gives unchecked discretion to prosecutors, medical providers, and courts to choose what conduct—and whose conduct—is found criminal.”\(^{189}\) The development of prosecutions for prenatal substance use being brought to federal courts is a troubling one. Expanding the jurisdiction under which these charges can be brought signals a trend toward increasing the number of these prosecutions across the country.

B. Evidence Of Fetal Harm In Prenatal Substance Use Prosecutions

As a result of these statutory schemes, state, and now federal, prosecutors bring cases criminalizing prenatal substance use without considering the scientific validity of whether prenatal substance use actually caused fetal harm. The issue is not that courts admit zero evidence speaking to the science behind the prosecution. Rather, it is that courts accept misleading or inconclusive evidence of fetal harm as scientific fact. This sort of misleading evidence often comes into court through physician and/or law enforcement testimony.

1. Physician and law enforcement testimony on fetal harm

Because physicians are trained in diagnosing conditions, rather than determining the exact cause of specific conditions, they are rarely qualified to testify to the background causes of fetal death or harm.\(^{190}\) Yet, in many cases, the delivering doctor or local medical examiner is permitted to testify as an expert on these issues.\(^{191}\) What’s more, police officers are sometimes permitted to testify about fetal endangerment. To demonstrate the danger that arises from the use of testimony from law enforcement officers, consider the case of Julie Starks.\(^{192}\) Starks, a pregnant woman, was arrested in a trailer that police believed was being, or had been, used to manufacture methamphetamine.\(^{193}\) At trial, the state argued that Starks exposed her child to dangerous fumes and called the arresting officer to the stand:

\[\text{[State]: Do you think you need a medical degree that would enable you to have an opinion that a pregnant woman should not have been in the environment that you were in [when you arrested her]} \ldots ?\]

\[\text{[Arresting officer]: I don’t believe I need a medical degree for that, no.}\]

---

\(^{189}\) Id.

\(^{190}\) Distinction is discussed \textit{infra} Part III, Section C.

\(^{191}\) See Paltrow & Jack, supra note 66, at 35.

\(^{192}\) \textit{In re Unborn Child of Starks}, 18 P.3d 542 (Okla. 2001).

\(^{193}\) Id.
State]: Okay. And do you have an opinion as to whether or not [Starks’] and her child’s safety were placed in danger by being in that lab?

[Arresting officer]: I felt it was . . . .

This is not scientific evidence of fetal endangerment, and thus cannot serve to prove the legitimate risk of harm that Starks allegedly posed to the fetus, yet the officer’s statements were admitted as valid testimony on the subject.

2. Courts are currently ill-equipped to be scientific fact-finders

For better or worse, courts can be central to scientific knowledge production. Courts tend to make bright-line determinations where there is scientific uncertainty and establish as fact scientific concepts contrary to accepted knowledge. When they do this, they legitimate the idea that there is a scientific finding where it may not exist. As such, courts are “purporting to be scientifically literate, and allowing in all kinds of evidence that would not make it within shouting distance of a peer-reviewed journal.”

As one example, courts have sentenced individuals to prison due to saliva exposure to HIV, though it has been proven that HIV cannot be transmitted this way. Courts have similarly issued inaccurate bright-line pronouncements in cases concerning prenatal drug use, such as in State v. McKnight, which centered on a Black woman’s stillbirth and her cocaine use during pregnancy. Though Regina McKnight’s conviction was later overturned, the South Carolina Supreme Court wrote in its opinion upholding the homicide conviction: “Given the fact that it is public knowledge that usage of cocaine is potentially fatal, we find the fact that McKnight took

---

194 Paltrow & Jack, supra note 66, at 35.
196 See id.; see also Erica Beecher-Monas, Lost in Translation: Statistical Inference in Court, 46 ARIZ. ST. L. J. 1057, 1060 (2014) (“[C]ourts tend to rely on rules of thumb and bright line cut-offs.”).
198 See Ahmed, supra note 195, at 646.
201 Among other issues, the state supreme court overturned the conviction because it considered defense counsel’s failure to investigate the relationship. Id. at 360.
cocaine knowing she was pregnant was sufficient evidence to submit to the jury on whether she acted with extreme indifference to her child’s life.”202

The court stated that public knowledge of the fatality of prenatal cocaine use was a “given”; however, when the court issued the decision in 2003, research imputing significant doubt on this conclusion had already been published.203 When courts promulgate misinformation or accept as fact scientific propositions that are highly contestable, they engage in a self-enforcing cycle of criminalization without evidentiary basis.

C. Judicial Treatment Of The Causal Relationship Between Cocaine Use And Fetal Harm

It is not clear how courts are currently adjudicating prenatal substance use cases, mainly because the overwhelming majority of these cases are resolved through guilty pleas or dismissals.204 Of those that go to trial, most decisions are not published. What can be gleaned is that, in several states, the law is not uniformly applied. The director of a Tennessee medical clinic stated that, “[t]here’s nothing formulaic about how the law is used . . . It depends what county they come from. We’re not sure what the state will do.”205 A criminal defense attorney echoed a similar issue in Alabama: “each county is its own little fiefdom . . . [y]ou get vastly different results in terms of how the cases are prosecuted.”206 The inconsistency of judicial handling of these cases can, and has, led to inequitable outcomes, such as the disproportionate criminalization of low-income people and people of color. Courts must therefore adopt a uniform approach to determine guilt in prenatal substance use cases.

III. USING THE G2I FRAMEWORK TO ANALYZE THE CAUSAL RELATIONSHIP BETWEEN PRENATAL SUBSTANCE USE AND FETAL HARM

Federal courts and most state courts are obligated to evaluate the methods and principles underlying scientific evidence submitted to them.207 But the approach that they take in evaluating such methods and principles, guided by the Frye and Daubert cases, is insufficient to address the question

202 Id. at 646.
203 See e.g., Beatrix Lutiger et al., Relationship Between Gestational Cocaine Use and Pregnancy Outcome: A Meta-Analysis, 44 TERATOLOGY 405, 411 (1991) (“[S]everal adverse effects commonly quoted to be associated with reproductive exposure to cocaine, such as abruptio placenta . . . fail to show by meta-analysis to have significantly increased risk despite a large number of studies.”).
204 See Lewis, supra note 14.
206 Martin & Yurkanin, supra note 69.
207 See Sanders et al., supra note 20, at 856.
of whether drug ingestion, among other potential factors, caused fetal harm—the central question in a prosecution for prenatal substance use. The process of differential etiology\(^\text{208}\), described here as the “G2i framework,” provides an alternate and more accurate means of determining this central question. In contrast to the prevailing approach to assessing scientific validity, the G2i framework accounts for specific causation—that is, whether drug ingestion caused fetal harm in the specific case before the court, rather than the general idea that it could possibly have caused the harm. Adopting the G2i framework to assess guilt for fetal harm would produce more uniform, equitable, and scientifically accurate outcomes in cases concerning prenatal substance use.

A. Assessing Scientific Validity In The Courtroom: Frye And Daubert

Much of the evidence tying prenatal substance ingestion to fetal harm comes in the form of expert testimony. Courts and prosecutors often rely on physicians to establish the finding that drug use causes fetal harm, even if those physicians are not qualified as experts on this topic. The admission of expert evidence is presently governed by the Supreme Court case Daubert v. Merrell Dow Pharmaceuticals, Inc., which replaced then-ruling precedent, Frye v. United States. However, some states continue to use the Frye standard.\(^\text{209}\) Ultimately, neither of these doctrines address the problem of extrapolating from general data to make decisions about an individual case, an issue that is of fundamental importance in determining the specifics of fetal harm in prenatal substance abuse cases.

1. The historical standard for scientific expert testimony: Frye v. United States

The Frye standard was established in 1923 by the D.C. Circuit in Frye v. United States\(^\text{210}\) and was the first major case addressing the increasing influence of science on the legal system.\(^\text{211}\) This standard “gave great deference to the views of forensic practitioners and not to empirical testing,”\(^\text{212}\) and it has been “liberally applied to favor admissibility of expert testi-

\(^\text{208}\) Differential etiology is “an inferential process combining statistical reasoning with a conceptual model of the causal interrelationships underlying observed data;” it is not simply a logical deduction. \textit{Id.} at 855.


\(^\text{210}\) Frye v. United States, 293 F. 1013 (D.C. Cir. 1923).


mony.” 213 It is often referred to as the “general acceptance” test. 214 The test requires an inquiry into whether novel scientific evidence is “generally accepted” in the scientific community. 215 The Frye court did not define “general acceptance,” which left courts across the country to make their own determinations. 216 Under Frye, general acceptance can be established in a variety of ways, including: 1) expert testimony as to the general acceptance of the underlying technique among experts in the profession; 2) authoritative scientific or legal writings showing that the scientific community accepts the underlying technique; and 3) judicial opinions indicating that the technique has gained general acceptance. 217 The Frye standard has been broadly critiqued for its vagueness, and specifically its focus on acceptance rather than reliability. 218 Critics have argued that the focus on general acceptance over scientific reliability leads to the admission of unreliable evidence in place of reliable evidence. One critic aptly described that a literal reading of the Frye decision overlooks the “cultural lag” during which time a new method “diffuse[s] through [the] scientific discipline” to create a body of scientific opinion, depriving courts of scientifically reliable evidence. 219 A D.C. trial court judge summarized this critique: “under Frye, as applied in this jurisdiction, even if a new methodology produces ‘good science,’ it will usually be excluded, but if an accepted methodology produces ‘bad science,’ it is likely to be admitted.” 220 Others argue that “Frye forces unqualified jurors to decide which scientific theories should be applied to the particular case.” 221

214 Id.
215 Id.
216 See Epps & Todorow, supra note 211. As one example, an Illinois court has stated that “’[g]eneral acceptance’ does not mean universal acceptance; and the methodology in question does not need to be accepted by unanimity, consensus, or a majority of experts. Rather, the underlying method used to generate an expert’s opinion must be reasonably relied on by other experts in the relevant field.” People v. Floyd, 11 N.E.3d 335, 341 (Ill. App. 2d Dist. 2014) (internal citations omitted).
217 § 45:2. Applying the Frye “general acceptance” test, 6 Jones on Evidence § 45:2 (7th ed.).
221 Id.
The Frye test has been displaced by federal courts and most state courts in favor of the Daubert standard. In Daubert v. Merrell Dow Pharmaceuticals, Inc., the Supreme Court “radically changed the standard for admissibility of scientific testimony” out of a concern that the Frye test was incompatible with Federal Rule of Evidence 702. The Daubert standard primarily seeks not whether there is “scientific certainty,” but whether expert testimony “rest[s] upon ‘good grounds.’” The Court instructed trial judges to make a “preliminary assessment” of scientific validity and relevancy, thereby assigning the trial judge the role of gatekeeper. The Court provided key points for trial judges to consider: 1) whether the theory or technique has been tested; 2) whether it has been subjected to peer review and publication; 3) the known or potential rate of error; and 4) whether there is general acceptance of the expert’s scientific methods. Overall, trial courts must determine whether the expert testimony is “more likely than not” true. The Daubert standard has been both criticized and refined in two subsequent Court decisions: General Electric Co. v. Joiner, 522 U.S. 136 (1997) and Kumho Tire Co., Ltd. v. Carmichael, 526 U.S. 137 (1999).
and lauded as “cast[ing] the trial judge in a ‘gatekeeper’ role.”231 Some argue that the standard “mak[es] unqualified judges evaluate the work of scientists”232 and that it is unable to address the problem of “junk science” in criminal cases.233

B. The G2i Framework As An Alternative Evidentiary Standard

In contrast to the current approaches to admitting scientific evidence, the G2i framework implements a more exacting analysis and therefore provides a useful structure to analyze criminal charges by requiring a showing of actual or substantial risk of harm. The framework was created by legal academics to guide lawyers and courts when they face the challenge of reasoning from group data (G) to make decisions about individuals (i).234 It was formulated as a method for analyzing causation in toxic tort cases. In the context of prenatal substance use cases, the G2i framework can be used to guide courts as they rely on data about substance use and fetal harm (G) to determine whether a specific defendant’s drug use caused the harm that their fetus may have suffered (i).

To accurately analyze scientific evidence, “courts must begin their consideration of scientific evidence by focusing on both whether it is ‘good’—that is, meets certain evidentiary standards—and on what it’s good for.”235 The G2i framework, in contrast to current evidentiary standards, accomplishes the latter requirement. One issue in prenatal substance use cases is that courts fail to recognize that having expertise in diagnosing illness (differential diagnosis236), as a doctor would have, is not the same as having expertise in assigning background causes to illnesses (differential etiology).237 G2i sets out to resolve this error. A key component of G2i is its requirement that courts assess an expert witness’s ability to provide empirical framework for evidence in addition to showing their ability to provide successful and to bring a collateral attack a person must first be convicted. A collateral attack is cold comfort to, and insufficient protection for, a wrongly convicted person.

231 McLeod, supra note 218, at 892.
232 Motorola Inc., 147 A.3d at 756.
234 See David L. Faigman et al., supra note 19, at 2.
235 Id. at 4.
236 Differential diagnosis is “the determination of which of two or more diseases with similar symptoms is the one from which the patient is suffering by a systematic comparison and contrasting of the clinical findings.” Sanders et al., supra note 20, at 857. Cf. Differential etiology, which is “an inferential process combining statistical reasoning with a conceptual model of the causal interrelationships underlying observed data.” Id. at 855.
237 See Sanders et al., supra note 20, at 859 (“First, the courts failed to distinguish between differential diagnosis as it is understood in the medical field and the search for the legally relevant background cause of an illness. Second, because of this confusion, the courts failed to recognize that expertise in arriving at a correct diagnosis does not necessarily transfer to expertise in assigning causes to illnesses.”).
diagnostic evidence. This distinction between differential diagnosis and differential etiology, often overlooked by courts, is crucial to making a showing of causality in cases that require a causal relationship between a defendant’s actions and the harm caused.

Unlike diagnosis, etiology is a legal construction “borne of necessity.” It is not a term used or developed by scientists. But, differential etiology is the only adequate approach in situations where courts rely on experts to prove specific causation or give diagnostic judgment. This is because, in the field of applied science, there are no certainties; all diagnostic judgments are probabilistic statements. As David Faigman, an expert in the intersection of law and science, puts it: “While science attempts to discover the universals hiding among the particulars, trial courts attempt to discover the particulars hiding among the universals.” The process of differential etiology, unlike current evidentiary standards, specifically seeks to find those particulars among the universals.

The central issue plaguing the current evidentiary standards for scientific evidence is not simply one of terminology, but one of understanding statistics. Judges do not appear to consider the underlying reasoning of statistics as used in scientific testimony. “The way scientists understand causal inference in their writings and practice . . . differs radically from the testimony jurists require to prove causation in court.” This produces a dangerous disconnect between how judges interpret scientific testimony and how it ought to be applied in a case of causal inference. This disconnect has severe consequences for criminal defendants. Courts have failed to develop a coherent “standard technique” to follow when tasked with answering background causal questions. Because of this, courts often exclude scientifically sound testimony but admit other testimony which lacks scientific basis.

C. The G2i Framework Applied To Prenatal Substance Use

The G2i framework is well suited for prenatal substance use cases, as criminal toxic causation has similar evidentiary elements to civil toxic causation. Both types of cases require a determination of whether a specific injury, or risk of injury, was in fact caused by a chemical substance. Pres-
ently, due to a misunderstanding of statistics, analysis often starts with the
individual, failing to first establish that the general phenomenon does, in
fact, exist. In other words, prosecutions begin by determining that the
pregnant person ingested drugs and experienced a miscarriage or stillbirth,
rather than first establishing whether their drug ingestion could have possi-
bly caused the adverse pregnancy outcome. If courts were to adopt this
framework in criminal cases involving prenatal drug use, it would remedy
this issue for criminal causation analysis.

Establishing causal impact under this framework requires proof of gen-
eral causation and specific causation. First, an expert must properly ascertain
the injury, or simply put, make a correct diagnosis. Second, an expert must
determine whether exposure to the substance at issue can cause the claimed
condition (finding general causation, or “ruling in”). Finally, an expert
must rule out alternative causes (finding specific causation, or “ruling
out”). It is vital that courts establish both general and specific causation.

These steps also parallel the requirements of Federal Rule of Evidence
702, which is the governing standard for admitting expert testimony. Rule
702 requires “sufficient data with which to reach a conclusion that the sub-
stance under question is the cause of the plaintiff’s injury and, equally im-
portant, a reliable method to address the effects of alternative possible
causes.” As presently applied, evidentiary standards do not meet this re-
quirement. The three steps of the G2i framework would more accurately
fulfill the mandate of Rule 702. This Note will not explore the first step,
correct diagnosis, because prenatal substance use cases do not turn on diag-
nosis. However, the second and third steps, “ruling in” and “ruling out,” are
relevant to these cases, and as such, are explored herein.

---

247 Id.
248 See Sanders et al., supra note 20, at 862.
249 See id.
250 See id.
251 Another way to understand this is through an analogy to cigarettes and lung cancer. It
is understood that smoking causes lung cancer, but that does not mean it causes every instance
of lung cancer. This issue captures the G2i problem well because in any given case, the ques-
tion would not be “can smoking cause cancer?”, but instead, did smoking cause cancer in this
case.
252 Fed. R. Evid. 702.
253 Sanders et al., supra note 20, at 893. It is referred to as a “weight-of-the-evidence”
methodology. See generally Austin Bradford Hill, The Environment and Disease: Association
or Causation, 108 J. ROYAL SOC’Y. MED. 32 (1965).
1. “Ruling in” or general causation

After diagnosing the condition, the second step is “ruling in,” which involves establishing general causation (“G”). One theory of establishing general causation comes from Sir Austin Bradford Hill, a leader in medical statistics. Hill’s theory was originally intended to guide scientists, but similarly applies in these cases where courts act as scientific adjudicators. Hill proposes nine factors to determine whether general causation exists:

- strength, consistency, specificity, temporality, biological gradient (also known as dose-response curve), plausibility, coherence, experiment, and analogy. Some argue that this method can be prone to “strategic misuse,” but that fear may be mitigated when applied in conjunction with specific causation.

In prenatal substance use cases, the operative question a judge must decide in “G” (general causation) to get to “i” (specific causation) is whether an illicit substance, such as cocaine, is a teratogen to a reasonable degree of confidence such that the law should be concerned. As an evidentiary matter, the judge must be convinced by a preponderance of evidence that cocaine is a teratogen among the general population. Put simply, a judge must be convinced that cocaine acts as a teratogen in at least some situations. Depending on how strictly the judge takes this requirement, the prosecution’s case may fail at this step. It is generally understood that cocaine is either a weak teratogen or not a teratogen at all, and “in any specific case determining the particular cause of preterm birth is often impossible.” A judge could determine on this basis that, applying the Hill guidelines, the evidence is not strong, consistent, or specific enough to conclude there is general causation to establish that cocaine produced the fetal harm. If general causation cannot be established, there “can be no specific causation determination.” A court may only move to the next step (determining “i”) if there is an adequate foundation demonstrated at “G.”

---

254 See generally id.
255 See Peter Armitage, Obituary: Sir Austin Bradford Hill, 1897-1991, 154 J. ROYAL STATISTICAL SOC’Y 482, 482 (1991) (“But to anyone involved in medical statistics, epidemiology or public health Bradford Hill was quite simply the world’s leading medical statistician. His position was universally recognized and unchallenged.”).
256 Hill, supra note 253, at 32.
257 A biological gradient or dose-response curve would show that greater exposure to a cause leads to greater incidence of the effect.
258 Hill, supra note 253, at 32.
260 See id. at 429.
261 As found previously, infra Part I, Section B.
262 Nagahawatte & Goldenberg, supra note 112, at 84.
263 Sanders et al., supra note 20, at 893.
2. “Ruling out” or specific causation

The third step in the process of differential etiology analysis is “ruling out” and concerns specific causation. Courts have offered “no real guidance” about the details of this step, however, a group of academics has created a systematic approach for courts to evaluate specific causation. Their approach to specific causation asks courts to consider three primary questions: 1) what is the evidence supporting the argument that the injury is an instance of a causal relationship instead of an unrelated, natural development; 2) what is the evidence that the injury is due to some other causal relationship; and in the event that there is a competing cause, which is the most likely scenario in most instances of specific causation; and 3) what is the comparative likelihood that the injury is a result of the asserted cause instead of the other possible cause(s).

a. G2i applied to criminal causation analysis

This test must be combined with the criminal law requirement to establish causation, which has two components: 1) factual or “but for” causation and 2) proximate causation. Factual causation is very straightforward—“it simply means that the harm would not have occurred in the absence of the defendant’s act.” This is parallel to the first question in a ruling out analysis, whether the evidence indicates a causal relationship. Proximate causation is less clear. The Supreme Court has described it as a “flexible concept” explained in terms of “foreseeability or the scope of the risk created by the predicate conduct.” Requiring a finding of proximate causation “serves, inter alia, to preclude liability in situations where the causal link between conduct and result is so attenuated that the consequence is more aptly described as mere fortuity.” Thus, a proximate causation analysis appears to combine the second and third questions within a ruling out analysis, (whether there is another possible cause and if so, the likelihood the injury arose from that cause). Similar to proximate causation, these ques-

---

263 A good example of this ruling out process is found in the remanded Daubert case; then-Judge Kozinski wrote for the majority: “In support of this conclusion, Dr. Palmer asserts only that Bendectin is a teratogen and that he has examined the plaintiffs’ medical records, which apparently reveal the timing of their mothers’ ingestion of the drug. Dr. Palmer offers no tested or testable theory to explain how, from this limited information, he was able to eliminate all other potential causes of birth defects, nor does he explain how he alone can state as a fact that Bendectin caused plaintiffs’ injuries.” Daubert v. Merrell Dow Pharm., Inc., 43 F.3d 1311, 1319 (9th Cir. 1995) (emphasis added).

264 See Sanders et al., supra note 20, at 894.


261 Id.

262 Id. at 445.
tions seek to ensure that, in the specific case, the effect is due to the alleged cause. In summary, the analysis for specific causation aligns with that for criminal causation.

b. Specific causation analysis where there are other possible causes of harm

Where there are multiple possible causes for a given effect, the effect is termed a “joint effect.” There are two statistical models to address this: the additive and multiplicative models. The latter is employed for etiological purposes. Under the multiplicative model, the effect of each factor is lessened when another factor is present, as a second factor may confound the relationship. Academics have employed the multiplicative model to compare the statistical probability that either “Drug X” or estrogen caused endometrial cancer in a specific case. This model is replicated later in this Note to demonstrate the statistical probability that either cocaine or poverty caused fetal harm in a specific case.

D. Poverty As A Confounder In The Causal Relationship Between Substance Use And Fetal Harm

Under the G2i framework, prosecutions for prenatal substance use must fail where a significant confounder is present. As this Note has discussed, cocaine is not a teratogen, or a weak one at best. But for the purpose of demonstrating the usefulness of the G2i framework, this analysis will assume that cocaine ingestion is independently harmful to a fetus. This is predominantly to demonstrate that even if a court, or the law, assumes cocaine is harmful, the confounding effect of poverty would render a specific causation conclusion impossible in many cases. It is important to note that this should not be taken to imply an association between cocaine use and poverty, but this Note presents poverty as the confounder because prosecutions for prenatal substance use are predominantly deployed against people in poverty.

There is extensive evidence that poverty is linked to low birth weight and preterm delivery (the same adverse effects associated with cocaine in-

---

271 Sanders et al., supra note 20, at 901.
272 See id. at 902.
273 Id. at 903.
274 See id.
275 Poverty is used here as the confounding variable because statistics demonstrate that most people arrested for prenatal substance use are indigent. However, as discussed briefly above, there are often many factors present which could contribute to the same negative fetal impacts. This analysis should be similarly applied for any other potentially confounding factors.
276 See Addis et al., supra note 111 (“It is impossible . . . to apportion the risk of cocaine vs the confounders.”).
Pregnant people who experience poverty are significantly less likely to receive adequate prenatal care, which increases the likelihood of having low birth weight infants. This relationship holds with regard to poor nutrition as well. Both access to care and access to nutritious foods are symptoms of poverty. The adverse birth effects associated with prenatal cocaine ingestion and poverty, independently, are so closely intertwined that “[r]esearchers cannot determine authoritatively which of this array of hazards actually caused the terrible outcomes they originally attributed to crack.”

Many of the problems seen in cocaine exposed babies are “just as likely to have been caused by other risk factors.”

Living in poverty creates a “cumulative risk” because it is possible that “[c]ocaine intensifies already well-recognized environmental hazards for mothers and their infants,” such as poverty. As mentioned earlier, those subject to criminal prosecution for prenatal cocaine use are often indigent. This cumulative risk poses a substantial obstacle to determining specific causation of fetal harm. Exposure to multiple risk factors “may overshadow any specific effects of prenatal cocaine exposure” and “[c]umulative risk models suggest that it is the number of risk factors rather than the nature of the specific risk factors that determine developmental outcome.” It is thus difficult to zero in on cocaine as the singular or primary cause of harm.

It is unsurprising that poverty exacerbates the propensity toward fetal harm in this context because it also functions this way for prenatal alcohol consumption. Fetal alcohol spectrum disorders (FASDs) are a possible outcome of drinking alcohol during pregnancy. One study found that pregnant women, regardless of socioeconomic status, consumed alcohol at the

---

277 See Jennifer D. Parker et al., Associations between Measures of Socioeconomic Status and Low Birth Weight, Small for Gestational Age, and Premature Delivery in the United States, 4 ANNALS OF EPIDEMIOLOGY 271, 275 (1994) (finding a “well-established relationship between low socioeconomic status and adverse birth outcome” as well as a “significantly elevated risk[ ] of [low birth weight] infants among both black and white mothers of low socioeconomic position” and “elevated risks of preterm delivery . . . among women of low socioeconomic status”).

278 See generally Kalmuss & Fennelly, supra note 113.

279 See Snodgrass, supra note 97, at 229.

280 See Roberts, supra note 15, at 953.

281 See generally Siddiqui et al., supra note 114, at 1.

282 Roberts, supra note 14, at 952.

283 Id.

284 See generally Lester & Tronick, supra note 100.


286 Tronick & Beeghly, supra note 102, at 165.

287 Lester & Tronick, supra note 100 at 117.

288 It is important to note that this does not mean that poverty should be criminalized.

same rate; however, low-income children had a 70.9% rate of Fetal Alcohol Syndrome, compared with a 4.5% prevalence for children born to upper income women. Further, comprehensive prenatal care, proper health care, and proper nutrition can improve outcomes or minimize the harm associated with prenatal cocaine exposure. Poverty, or the failure of government to provide necessary goods and services, creates or exacerbates fetal harm.

Assuming that cocaine ingestion during pregnancy could independently risk fetal harm, a G2i analysis demonstrates that the cumulative effect posed by living in poverty overshadows cocaine use. Under these assumptions, there may be a risk of fetal harm for those who do not live in poverty but do use cocaine. For those who do not use cocaine during pregnancy but live in poverty, there may be a significant risk of harm due to poverty. However, for those who live in poverty, using cocaine does not increase the risk of fetal harm as much as it might for those who do not live in poverty. The relative risk of either factor is affected by the presence of the other. This idea is explained in the chart below, which uses the same hypothetical data to illustrate the concept of cumulative risk:

<table>
<thead>
<tr>
<th>Poverty</th>
<th>Prenatal Cocaine Use</th>
<th>Relative Risk (Risk Ratio)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Never Used Cocaine</td>
<td>Risk Difference</td>
</tr>
<tr>
<td>Not Living in</td>
<td>During Pregnancy</td>
<td></td>
</tr>
<tr>
<td>Poverty</td>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td>Living in</td>
<td>150</td>
<td>300</td>
</tr>
<tr>
<td>Poverty</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Risk Difference</td>
<td>3</td>
<td>1.5</td>
</tr>
</tbody>
</table>

As seen in the chart, the ability to identify which condition, poverty or cocaine use, caused harm is confounded when more than one factor is present. Here, the relative contribution of cocaine use to fetal harm for a person liv-

---

290 See Roberts, supra note 15, at 953.
291 Id. It is important to note that this in no way indicates that alcohol consumption during pregnancy can or should be criminalized. No state criminalizes alcohol use during pregnancy, so it is a good comparison point. It is not criminal, but it is more harmful than cocaine use.
292 See id. at 953–54.
293 This causal dynamic is comparable to that of the criminalization of homelessness in which "a lack of services creates the very conditions of lawlessness." Roberts, supra note 15, at 953. Cities across the country “mak[e] the daily tasks of living for the homeless a crime,” by passing laws that ban sleeping, eating, and sitting in public spaces. Michele E. Gilman, The Poverty Defense, 47 U. RICHTER L. REV. 495, 497 (2013). In the same way, the law criminalizes pregnant substance users for harm that would be substantially mitigated, if not eliminated, by the provision of government services like access to healthcare and nutritious food.
294 This data was not taken from actual sources. Rather, it was created by the authors to demonstrate how such a calculation would be made.
ing in poverty is represented by the risk ratio of 1.5. The relative contribution of cocaine to fetal harm for a person not living in poverty is represented by the risk ratio of 4. Using the multiplicative model, there can be no finding of specific causation in a case in which the pregnant person using cocaine lives in poverty. This is because the impact of poverty is far greater than the impact of cocaine when both factors are present. The risk of harm from one factor cannot be separated from the risk of harm for another: they work together to produce a stronger effect.

This confounding relationship is not exclusive to cocaine among illicit substances, nor is it to poverty and cocaine use. Poverty is a placeholder for the variety of factors that can produce this cumulative risk, such as poor nutrition, prenatal cigarette use or alcohol consumption, physical abuse, poor healthcare, or structural racism. It can also be substituted for environmental risks, such as lead-infested drinking water or exposure to tear gas or sulfur dioxide. Just as poverty itself is not a substantive crime, neither are these other possible confounders.

In summary, the fetal harm associated with the ingestion of chemical substances is too closely intertwined with, and thus confounded by, a multitude of other factors such that specific causation cannot be determined. In criminal law terms, proximate causation cannot be established. Hence, under the G2i framework requiring both general and specific causation, prosecutions for prenatal substance use must fail in most, if not all, cases.

CONCLUSION

In a 1998 article, Justice Stephen Breyer stressed the importance of building “legal foundations that are sound in science as well as in law.” Yet this goal has not come to fruition. Courts are sentencing pregnant people to prison for causing fetal harm without finding a substantially causal relationship between substance use and fetal harm. Because courts accept scientifically inaccurate information and fail to adequately address criminal causation, they cause pregnant people to unjustly bear the burden of the legal system’s inadequacy. This is not a radical sentiment. The scientific community has overwhelmingly come out against these arrests and prosecutions, and the American Bar Association has passed a resolution opposing criminal prosecution of anyone who has experienced a miscarriage or stillbirth. Still, the impetus to criminalize prenatal substance use continues. In fact, a

---

295 Adapted from Sanders et al., supra note 20, at 903.
prenatal substance use case was heard, and upheld, by the Eighth Circuit in 2019—the first to enter a federal court.

The war on pregnant bodies has intensified in the wake of the Supreme Court’s decision to revoke the constitutional right to abortion on June 24, 2022, in Dobbs v. Jackson Women’s Health Organization. Almost immediately, states declared open season on pregnant people—instantly banning access to abortion, prescribing prison sentences for abortion providers, and raising an interest in banning interstate travel for the purpose of obtaining an abortion. Additionally, laws that already existed on the books, but were enjoined pursuant to Roe v. Wade, may soon become enforceable.

As one example, a Georgia law enacted in 2019 would hold pregnant people using drugs liable for second-degree murder, which carries a ten to thirty year prison sentence.

The substantial and increasing threats of incarceration have also induced a panic regarding data privacy—specifically, the police use of texts, internet searches, and apps used to track the menstrual cycle. These fears are not unfounded. In August 2022, a 17-year-old and her mother were criminally charged in connection with the 17-year-old’s self-managed abortion. The charge relies on Facebook messages between mother and daughter that

---


299 See Case Comment, supra note 188.


301 Total abortion bans took effect on the same day as the Dobbs decision in Alabama, Arkansas, Missouri, South Dakota, and Utah. Oklahoma already had a ban in effect before the decision. See Caroline Kitchener, et al., Abortion is now banned in these states. See where laws have changed, Wash. Post (Jun. 24, 2022, 10:23 AM), https://www.washingtonpost.com/politics/2022/06/24/abortion-state-laws-criminalization-roe/, archived at https://perma.cc/BB3J-DUKL.


307 See id.
Facebook itself produced for the court.\textsuperscript{308} While this story has received substantial attention, it once again overlooks the threat that healthcare provider reporting has always played, and continues to play, in the criminalization of pregnancy.\textsuperscript{309} These newfound fears of data privacy similarly ignore the long and unrelenting history of criminalizing pregnant bodies, particularly for women of color, that has always existed in the United States—even while abortion was recognized as a constitutional right. Without that right, however, the landscape only becomes bleaker.

It is clear that neither state legislatures nor prosecutors are going to concede their war on pregnant bodies, nor will the federal government step in to prevent it.\textsuperscript{310} The onus thus lies on courts to invalidate laws criminalizing prenatal substance use, or at minimum, to adopt the procedures outlined herein to ensure that pregnant people using substances are not unjustly imprisoned. Courts similarly must consider the role of poverty, racism, and systemic injustice in criminalizing the bodies of those who lose their pregnancies. By assuming that the only possible cause of harm is drug use, prosecutors and the courts ignore evidence pointing toward the influence of any number of other factors that would result in statistically possible or actual harm to a fetus. It is impossible to distinctly discern which factor, among an intersection of influences, caused any fetal harm.\textsuperscript{311} This creates nearly insurmountable reasonable doubt in determining whether drug use caused the harm. Prosecutions for prenatal substance use “not only lack legal foundation, they also lack medical and scientific foundation. In other words, [prenatal substance use prosecutions] are based on junk law and junk science.”\textsuperscript{312} If the courts, and the law more broadly, aim to retain any legiti-
2022] Risky Business 835

macy, they cannot continue enforce criminal penalties for prenatal substance use.

regardless of gestational age, despite full autopsy examination by specialist pathologists.”}