The Opioid Crisis: Prenatal Exposure and Caregiving

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Associate Professor of Psychology at Slippery Rock University and the Program Director of the SRU Neuroscience and pre-professional studies programs. Dr. Willford received her Ph.D. in Experimental Psychology with a concentration in Behavioral and Neural Studies at the University of Kentucky in 2000, completed a postdoctoral fellowship at the University of Kentucky, and joined the faculty at the University of Pittsburgh School of Medicine in the Department of Psychiatry in 2003-2012. As a graduate student, Jennifer worked on the effects of prenatal alcohol and cocaine exposure on behavioral and neural processes in an animal model. While at the University of Pittsburgh, her research focused on the role of early caregiving relationships on the development of emotion and behavior regulation systems in at-risk infants.
Agenda
• Scope of the problem
  • What are opioids
• What is the impact?
  • Parents
  • Infants
  • Infant-Parent relationship
• Helping and Early Intervention
• Resources

Dispelling the Myths
Opiates prescribed by parents’ doctors are the most common risk factor for misuse.

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Opiates prescribed by parents’ doctors are the most common risk factor for misuse.

Substance misuse tends to be more likely when someone gets ahold of a family or friends prescription medication.
Dispelling the Myths

Parents who are misusing substances have a known history of using illegal drugs.

TRUE ○ FALSE

Dispelling the Myths

Parents who are misusing substances have a known history of using illegal drugs.

Many have a history of chronic pain and misuse started with prescribed opioids, and even more likely used prescription pain medications that they acquired from family or friends.

TRUE ○ FALSE

Dispelling the Myths

Prescription pain relief medication misuse is more than 10x more common than heroin.

TRUE ○ FALSE
Dispelling the Myths

Prescription pain relief medication misuse is more than 10x more common than heroin.

Dispelling the Myths

86% of pregnancies in women who struggle with opioid misuse are unintended.
I. What is the scope of the problem?

National Institute of Health (NIH)

Every day, more than 130 people in the United States die after overdosing on opioids. The misuse of and addiction to opioids—including prescription pain relievers, heroin, and synthetic opioids such as fentanyl—is a serious national crisis that affects public health as well as social and economic welfare.

The Centers for Disease Control and Prevention estimates that the total "economic burden" of prescription opioid misuse alone in the United States is $78.5 billion a year, including the costs of healthcare, lost productivity, addiction treatment, and criminal justice involvement.

How did this happen? (NIH)

In the late 1990s, pharmaceutical companies reassured the medical community that patients would not become addicted to prescription opioid pain relievers, and healthcare providers began to prescribe them at greater rates. This subsequently led to widespread diversion and misuse of these medications before it became clear that these medications could indeed be highly addictive. Opioid overdose rates began to increase. In 2017, more than 47,000 Americans died as a result of an opioid overdose, including prescription opioids, heroin, and illicitly manufactured fentanyl, a powerful synthetic opioid. That same year, an estimated 1.7 million people in the United States suffered from substance use disorders related to prescription opioid pain relievers, and 652,000 suffered from a heroin use disorder (not mutually exclusive).
Opioid Misuse During Pregnancy

Ohio's children's services agencies overwhelmed by opioid crisis

In Ohio women abuse opioids more than men.
...and they tend to be child-bearing age

II. Understanding opiates – their power, pathways and risks
In 2016, synthetic opioids (primarily illegal fentanyl) passed prescription opioids as the most common drugs involved in overdose deaths in the United States.

In 2016, synthetic opioids were involved in nearly 50% (19,413) of opioid-related deaths, up from 14% (3,007) in 2010.
Opiates and the Brain

Opiates scramble pain messages coming from the body to the brain via the spinal cord.

Opiates can affect the function of the brainstem and slow breathing.

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Opiates and the Brain

Opiates can affect the function of the brainstem and slow breathing.

Opiates affect the emotional and memory centers of the brain.

Opiates scramble pain messages coming from the body to the brain via the spinal cord.

Opiates highjack the reward pathway in the brain.

Opiates “push” more dopamine into the reward pathway.

Opiates can affect the function of the brainstem and slow breathing.

Opiates affect the emotional and memory centers of the brain.

Opiates scramble pain messages coming from the body to the brain via the spinal cord.

Opiates can affect the function of the brainstem and slow breathing.

Opiates affect the emotional and memory centers of the brain.

Opiates scramble pain messages coming from the body to the brain via the spinal cord.
**Pathways to Parent Addiction**

- Prescription Pain Relievers
- Injection Drug Use
  - Physical Pain: Chronic and acute medical conditions
  - Mental Health: Anxiety and Depression
  - Trauma: Adverse Childhood Experience

**Opiate Misuse During Pregnancy**
- Harms to Mom
  - Dependency, physical and psychological
  - Weakened immune system
  - Nausea and Vomiting (reduced appetite)
  - Overdose risk
  - Slow breathing rate
  - Hallucinations
  - Difficulty caring for herself

**Opiates and Fetal Exposure**
- Opiates accumulate in amniotic fluid and are able to cross the placenta (within 1 hour of mother’s use)
- The growing fetus has a difficult time with detox and metabolism of the drug due to immature tissues.
- Fluctuations in drug levels cause placental changes → placental insufficiency and IUGR
Opiates and Obstetric Complications

Women who use opiates during pregnancy have a six-fold increased risk of obstetric complications, with no clear cause. Risks include:

- Spontaneous Abortion
- Low Birthweight
- Intrauterine Growth Retardation
- Preeclampsia
- Placental Abruption
- Premature birth

Opiates and Birth Complications

Women who use opiates during pregnancy are also at risk for birth complications. Risks include:

- Fetal distress
- Fetal demise
- Low APGAR scores
- Postpartum hemorrhage
- Meconium aspiration
- Maternal infection that affects the placenta and membranes that surround the growing baby

Opiates and Newborn Complications

Babies whose mothers used opiates during pregnancy are at risk for:

- No consistent pattern of congenital anomalies
- Microcephaly
- Neurobehavioral problems
- Postnatal growth deficiency
- SIDS
- NAS
Other Risks: Trauma and Criminalization

What are the other risks? Trauma
What are the other risks? Criminalization

Women who fear criminalization for their drug use during pregnancy are less likely to seek prenatal care.

Real Risks: Because they are often criminalized and ostracized, substance use and other substance use can carry additional risks unrelated to their pharmacological effects.

How can we advise mothers and lower risk for pregnancy related complications?

Get Prenatal Care

- Visit your doctor at least once a month during pregnancy.
- Tell your doctor about any new symptoms you notice.
- Don't smoke, drink alcohol, or use illegal drugs.

Reduce Your Use

- Try to stay away from people who do drugs.
- Make plans to spend time with friends who don't use drugs.
- Use medication-assisted treatment to help you quit.

Use Medication-Assisted Treatment (MAT) for Opioids

- MAT can help prevent withdrawal symptoms and reduce cravings.
- It can also help improve mental health and decrease the risk of relapse.

Take Good Care of Yourself

- Eat healthy foods and exercise regularly.
- Get enough sleep each night.
- Avoid stress and manage it when you can.
III. What are the impacts of opiate exposure on the baby? What do we know so far?

Opioids and infants

Babies are exposed to opioids when:

- Prescribed to mothers during pregnancy for pain control
- Buprenorphine or methadone are prescribed to treat addiction to opioids
- Mom uses illegal opioids such as heroin or fentanyl
What is Neonatal Abstinence Syndrome (NAS)?
Neonatal abstinence syndrome (NAS) is a clinical diagnosis and set of symptoms associated with the abrupt withdrawal of opioids and other drugs when infants are born to mothers who were taking these substances. The symptoms can range from mild to severe and include:

- Low birth weight
- Restricted growth
- Premature delivery
- Breathing problems
- Feeding difficulties
- Tremors (trembling)
- Irritability (excessive crying)
- Alterations in tone and movement (hyperactive primitive reflexes, hypertonicity, tremors, skin excoriations)
- Seizures
- Sleep-wake disturbance
- High-pitched crying
- Yawning, stuffy nose, and sneezing
- Vomiting
- Diarrhea
- Dehydration
- Sweating
- Fever or unstable temperature
- Hypersensitivity to stimulation (light, sound, handling)

NAS Assessment
- Measuring NAS severity helps guide early interventions including initiation and termination of treatments
- The Neonatal Abstinence Scoring System is the most commonly used scale assessing presence and severity of 31 items
- Scoring performed at 2-4 hour intervals when the infant is awake after feeds
- Modified over time, a commonly accepted score of 8 or more on three consecutive assessments, or 12 on two consecutive assessments, achieves severity cutoff meriting treatment
**Finnegan Definition of a High Pitched Cry**

“When the infant is unable to decrease crying within a 15 second period... or if the infant continues to cry intensely or continuously for up to 5 minutes ... if these signs are present this item (excessive high pitched cry) should be scored whether the infant’s cry is high pitched or not.”

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**Spectrograms of Infant Cry Before and After Treatment**

[Image of spectrograms showing changes in cry patterns before and after treatment]

- Finnegan = 8, high pitched cry, start pharmacological treatment
- Pitch = 473 Hz

- Finnegan < 8, no high pitched cry, discharge day 2
- Pitch = 472 Hz

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**Myoclonic Jerk**

[Image of myoclonic jerk]
Myoclonic Jerk

- https://www.youtube.com/watch?v=5mAs5-aOzso

NAS in Ohio

- The incidence of NAS increased from 20 cases per 10,000 live births in 2006 to 155 cases per 10,000 live births in 2015—an almost eightfold increase (Ohio DOH).

- The national average across 28 states included in a separate 2013 analysis was 6.0 cases per 1,000 births (CDC, MMWR, 2014).
### Drug Abuse/Dependence at Delivery in OH (2006-2015)

<table>
<thead>
<tr>
<th>Year</th>
<th>Year Code</th>
<th>Drug Abuse/Dependence Diagnosis at Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>105</td>
<td>1,504</td>
</tr>
<tr>
<td>2007</td>
<td>109</td>
<td>1,472</td>
</tr>
<tr>
<td>2008</td>
<td>113</td>
<td>1,534</td>
</tr>
<tr>
<td>2009</td>
<td>117</td>
<td>1,552</td>
</tr>
<tr>
<td>2010</td>
<td>121</td>
<td>1,556</td>
</tr>
<tr>
<td>2011</td>
<td>125</td>
<td>1,585</td>
</tr>
<tr>
<td>2012</td>
<td>129</td>
<td>1,607</td>
</tr>
<tr>
<td>2013</td>
<td>133</td>
<td>1,629</td>
</tr>
<tr>
<td>2014</td>
<td>137</td>
<td>1,629</td>
</tr>
<tr>
<td>2015</td>
<td>141</td>
<td>1,629</td>
</tr>
</tbody>
</table>

**Note:** Year codes for 2006 to 2015 (Code could be in primary or 3rd secondary diagnosis).

### NAS Hospitalizations in OH (2006-2015)

<table>
<thead>
<tr>
<th>Year</th>
<th>Year Code</th>
<th>NAS Hospitalizations in OH</th>
<th>Diagnosis &amp; Dependence</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>105</td>
<td>2,250</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>109</td>
<td>2,214</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>113</td>
<td>2,805</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>117</td>
<td>2,697</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>121</td>
<td>2,754</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>125</td>
<td>3,298</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>129</td>
<td>3,777</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>133</td>
<td>4,016</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>137</td>
<td>4,695</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>141</td>
<td>4,680</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Year codes for 2006 to 2015 (Code could be in primary or 3rd secondary diagnosis).
NAS Hospitalizations in OH (2006-2015)

Table 1: Hospitalizations for Neonatal Abstinence Syndrome

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total count</td>
<td>895</td>
<td>688</td>
<td>477</td>
<td>778</td>
<td>863</td>
<td>3,973</td>
<td>1,483</td>
<td>1,157</td>
<td>1,265</td>
<td>1,193</td>
</tr>
<tr>
<td>Exclude preterm</td>
<td>252</td>
<td>198</td>
<td>149</td>
<td>206</td>
<td>202</td>
<td>801</td>
<td>481</td>
<td>481</td>
<td>481</td>
<td>481</td>
</tr>
<tr>
<td>Preterm admission</td>
<td>65</td>
<td>81</td>
<td>108</td>
<td>112</td>
<td>142</td>
<td>174</td>
<td>149</td>
<td>215</td>
<td>178</td>
<td>224</td>
</tr>
<tr>
<td>Preterm average</td>
<td>16.1</td>
<td>15.1</td>
<td>28.1</td>
<td>35.6</td>
<td>35.0</td>
<td>5.67</td>
<td>5.73</td>
<td>3.19</td>
<td>3.0</td>
<td>3.3</td>
</tr>
<tr>
<td>Average stay</td>
<td>9.9</td>
<td>9.9</td>
<td>9.9</td>
<td>9.9</td>
<td>9.9</td>
<td>11.0</td>
<td>11.0</td>
<td>11.0</td>
<td>11.0</td>
<td>11.0</td>
</tr>
<tr>
<td>Total cost</td>
<td>$1,032,910</td>
<td>$901,300</td>
<td>$891,900</td>
<td>$911,100</td>
<td>$941,800</td>
<td>$8,001,800</td>
<td>$994,800</td>
<td>$911,100</td>
<td>$1,032,900</td>
<td>$941,800</td>
</tr>
<tr>
<td>Total cost per stay</td>
<td>$1,104.07</td>
<td>$1,104.07</td>
<td>$1,104.07</td>
<td>$1,104.07</td>
<td>$1,104.07</td>
<td>$1,104.07</td>
<td>$1,104.07</td>
<td>$1,104.07</td>
<td>$1,104.07</td>
<td>$1,104.07</td>
</tr>
</tbody>
</table>

Health Outcomes in OH (2015)

Table 2: Health outcomes in inpatient settings, NAS infants* vs. all infants, Ohio

<table>
<thead>
<tr>
<th>Health Outcomes</th>
<th>NAS Infants (%)</th>
<th>All Infants (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeding Difficulties</td>
<td>16.45</td>
<td>5.36</td>
</tr>
<tr>
<td>Low Birth Weight</td>
<td>19.63</td>
<td>9.90</td>
</tr>
<tr>
<td>Respiratory Symptoms</td>
<td>21.63</td>
<td>9.44</td>
</tr>
<tr>
<td>Seizure and Convulsion</td>
<td>3.75</td>
<td>0.13</td>
</tr>
</tbody>
</table>

*See Codes: ICD-9 code 777.5 (Neonate and Newborns)

NDQ: NDQ 777.5 (NAS) *Could be in primary or 18 secondary codes

*See Codes: ICD-10 code Z01.01 and Z01.21 (Could be in primary or 18 secondary codes)

*Denote each group by the total number of NAS infants to get %
Health Outcomes in OH (2015)

Table 2: Health outcomes in inpatient settings, NAS infants* vs. all infants, Ohio

<table>
<thead>
<tr>
<th>Setting</th>
<th>Inpatient (all)</th>
<th>Ohio Residents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Ohio hospitals</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Query Codes</td>
<td>M959.99-999 (Neonates and Newborns)</td>
<td></td>
</tr>
</tbody>
</table>

*NAS: NAS (5599-999) could be in primary or secondary fields

2015

<table>
<thead>
<tr>
<th>Health Outcomes</th>
<th>NAS Infants (%)</th>
<th>All Infants (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Birth Weight</td>
<td>12.63</td>
<td>9.98</td>
</tr>
<tr>
<td>Respiratory Symptoms</td>
<td>21.63</td>
<td>9.66</td>
</tr>
<tr>
<td>Jaundice and Convulsion</td>
<td>0.79</td>
<td>0.13</td>
</tr>
</tbody>
</table>

state opioid-involved overdose death rates and opioid prescribing levels

<table>
<thead>
<tr>
<th>State</th>
<th>Opioid-Involved Deaths/100,000 persons 2017</th>
<th>Opioid Prescriptions/100 persons 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Virginia</td>
<td>40.6</td>
<td>61.3</td>
</tr>
<tr>
<td>OH</td>
<td>39.2</td>
<td>62.5</td>
</tr>
<tr>
<td>Washington D.C.</td>
<td>34.7</td>
<td>28.5</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>34.0</td>
<td>52.8</td>
</tr>
<tr>
<td>Maryland</td>
<td>32.2</td>
<td>51.7</td>
</tr>
<tr>
<td>Maine</td>
<td>25.9</td>
<td>55.7</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>28.3</td>
<td>40.1</td>
</tr>
<tr>
<td>Kentucky</td>
<td>27.9</td>
<td>86.0</td>
</tr>
</tbody>
</table>
Infants with NAS Video


Child Effects

- "There are no published developmental outcome studies of infants with NAS" (Lester, 2017)
- While not a certainty, children exposed in utero may have different abilities to explore, signal distress, experience regulation, or appreciate physical discomfort.
- NAS symptoms (e.g., irritability, high pitched crying, feeding problems, etc.) may increase stress and reduce reward and motivation for caregiving
IV. What is the impact of opiates on parenting and the infant/caregiver relationship?
Parental Opioid Abuse: A Review of Child Outcomes, Parenting, and Parenting Interventions

Virginia Pinola1,2, Alexandra D. Sullivan1,2, Niclee Lufke Schrock1,2, Karen Benol1,2, Stacey C. Signore1,2, Greg L. Fendholm2, Jessica Stryker-Goldman1,2, Ken Fendholm2

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Abstract

Opioid abuse is now considered an epidemic, and many of the adults using this substance are parents. The purpose of the current paper is twofold: (1) to review rigorously conducted studies (e.g., included a comparison group; utilized inferential statistics) examining the association of opioid abuse with parenting and child outcomes, and (2) to review parenting interventions programs with these concerns. Findings indicate that there are very few rigorously conducted studies examining children and parenting when parents abuse opioids. Furthermore, only four intervention programs have been conducted using randomized control trials and inferential statistics. We conclude that there is limited research that can be labeled as rigorous science currently addressing this aspect of the opioid epidemic. Recommendations for further research are delineated.

Keywords: Parental opioid abuse • Parenting • Child outcomes • Interventions

<table>
<thead>
<tr>
<th>Study (Year)</th>
<th>Interactions</th>
<th>Parenting</th>
<th>Child Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown et al. 1999</td>
<td>Bonding</td>
<td>Parenting</td>
<td>Child Outcomes</td>
</tr>
<tr>
<td>Jones et al. 2001</td>
<td>Bonding</td>
<td>Parenting</td>
<td>Child Outcomes</td>
</tr>
<tr>
<td>McCallum et al. 2005</td>
<td>Bonding</td>
<td>Parenting</td>
<td>Child Outcomes</td>
</tr>
<tr>
<td>Perry et al. 2013</td>
<td>Bonding</td>
<td>Parenting</td>
<td>Child Outcomes</td>
</tr>
<tr>
<td>Ads et al. 2004</td>
<td>Bonding</td>
<td>Parenting</td>
<td>Child Outcomes</td>
</tr>
<tr>
<td>Sall et al. 2011</td>
<td>Bonding</td>
<td>Parenting</td>
<td>Child Outcomes</td>
</tr>
<tr>
<td>Lauer 2008</td>
<td>Bonding</td>
<td>Parenting</td>
<td>Child Outcomes</td>
</tr>
</tbody>
</table>

**Table 1.** Parental and parent-child interactions: comparison of OPCA and comparison samples

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Fig 2. The context of parental opioid abuse, parenting, and child outcomes.
Relationships are the “active ingredients” of the environment’s influence on healthy human development


infant-mother relationships and opioids

Not all mothers with SUDs histories struggle as parents, but many do… the risk for relational problems is increased

- Lowered sensitivity and responsiveness to infant emotional cues
- Difficulty responding to infant distress
- Difficulty supporting social-emotional and cognitive development
- Oscillation between intrusive, over-controlling, and passive-withdrawal parenting styles
- Deficits in reflective function
- Unpredictable and chaotic caregiving
- Unmet basic needs such as nutrition, supervision and nurturing
- Child abuse, neglect and foster care
- Other challenges such as mental illness, domestic violence, unemployment, housing instability

Mom’s with SUDs are more likely to demonstrate
<table>
<thead>
<tr>
<th>...there are often significant relational concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>• &quot;The substance-exposed mother and child are difficult regulatory partners for each other, as the exposed infant often has an impaired ability to regulate his states ... and needs more parental help. At the same time, the mother usually has a reduced capacity to read the child's signals. This combination easily leads to a viciously negative cycle that culminates in withdrawal from interaction and increased risk for child neglect and abuse.</td>
</tr>
<tr>
<td>• (Pajulo et al., 2006)</td>
</tr>
</tbody>
</table>

Paris and Sommer (2015)
...there are often significant relational concerns

• "The substance-exposed mother and child are difficult regulatory partners for each other, as the exposed infant often has an impaired ability to regulate his states ... and needs more parental help. At the same time, the mother usually has a reduced capacity to read the child's signals. This combination easily leads to a viciously negative cycle that culminates in withdrawal from interaction and increased risk for child neglect and abuse."  
  • [Pajulo et al., 2006]

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**Parenting and the Neurobiology of Addiction**

• Opioids act on the dopamine circuitry of the brain, leading to changes in pleasure/reward interactions.
• **Previously rewarding** patterns in relationships, parenting, self-efficacy and self-care are no longer as rewarding
  • Parenting is less gratifying
    • e.g., Close physical contact with infant, enjoying infant’s growth and development, feeling connected with infant emotionally, etc.
  • Plus, there is reduced tolerance for challenges of parenting
    • e.g., crying, needy infant, sleep deprivation, attunement to infant’s needs, etc.

---

Paris and Sommer (2015)
What are the other risks? Trauma

ACES are ADVERSE CHILDHOOD EXPERIENCES
End Part 1

VII. Resources

Clinical Guidance for Treating Pregnant and Parenting Women with Opioid Use Disorder and Their Infants

SAMHSA has released a new tool to assist health care providers in caring for pregnant women and new mothers with opioid use disorder and their infants. The new publication, Clinical Guidance for Treating Pregnant and Parenting Women with Opioid Use Disorder and Their Infants, includes 16 fact sheets, with each fact sheet containing four elements:

- clinical scenario
- clinical action steps
- supporting evidence and clinical
References and Resources


• Advancing the Care of Pregnant and Parenting Women with Opioid Use Disorder and their Infants. http://files.www.cmhnetwork.org/news/Advancing_the_Care_of_Pregnant_and_Parenting_Women_with_Opioid_Use_Disorder_and_their_Infants_/Advancing_the_Care_of_Pregnant_and_Parenting_Women_with_Opioid_Use_Disorder_and_their_Infants.pdf


• The Alliance for the Advancement of Infant Mental Health®

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Thank you