The Opioid Crisis: Prenatal Exposure and Caregiving

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- Associate Professor of Applied Developmental Psychology
- Coordinator for MS programs in Applied Developmental Psychology at the University of Pittsburgh
- Endorsed in Infant Mental Health at the Mentor-Faculty level through the Alliance for the Advancement of Infant Mental Health
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- Founding president of the Pennsylvania Association for Infant Mental Health (PA-AIMH)
- Communications Chair for the Academy of ZERO TO THREE Fellows

Jennifer Willford, Ph.D.

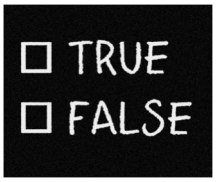
Associate Professor of Psychology at Slippery Rock University and the Program Director of the SRU Neuroscience and pre-professional studies programs. Dr. Willford received her Ph.D. in Experimental Psychology with a concentration in Behavioral and Neural Studies at the University of Kentucky in 2000, completed a postdoctoral fellowship in psychiatric epidemiology in 2003, and was previously on the faculty at the University of Pittsburgh School of Medicine in the Department of Psychiatry (2003-2012). As a graduate student, Jennifer worked on the effects of prenatal alcohol and cocaine exposure on learning and memory in an animal model. While at the University of Pittsburgh, she transitioned into work with human populations with the Maternal Health Practices and Child Development project, focusing on research of the effects of prenatal drug exposure on neuropsychological and brain imaging outcomes. Her current research interest is in the role of early childhood environments, prenatal exposures, and 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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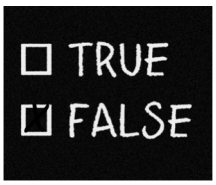
Substance misuse tends to be more likely when someone gets ahold of a family or friends prescription medication.



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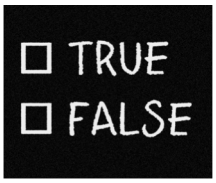
Parents who are misusing substances have a known history of using illegal drugs.



Dispelling the Myths

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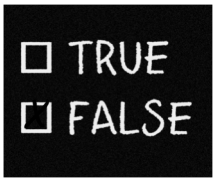
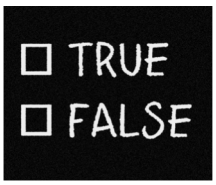
Many have a history of chronic pain and misuse started with prescribed opioids, and even more likely used prescription pain medications that they acquired from family or friends.



Dispelling the Myths

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



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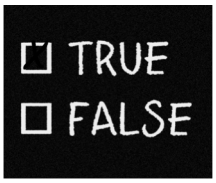
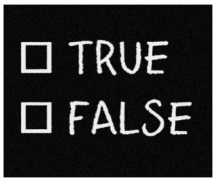


Dispelling the Myths

86% of pregnancies in women who struggle with opioid misuse are unintended.



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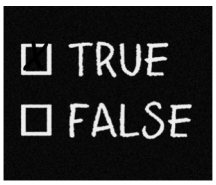
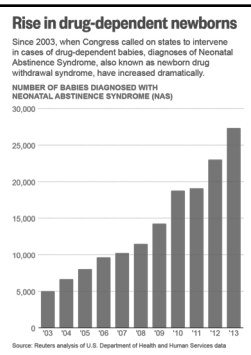


I. What is the scope of the problem?



National Institute of Health (NIH)

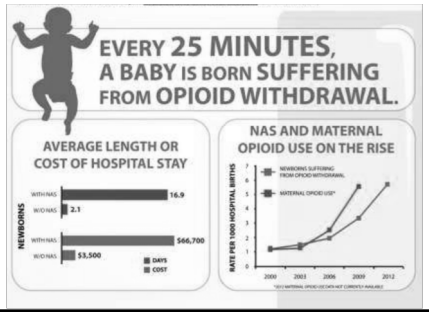
Every day, more than 130 people in the United States die after overdosing on opioids.1 The misuse of and addiction to opioids—including prescription pain relievers, heroin, and synthetic opioids such as fentanyl—is a serious national crisis that affects public health as well as social and economic welfare.

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.2

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.3,4 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.1 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).5

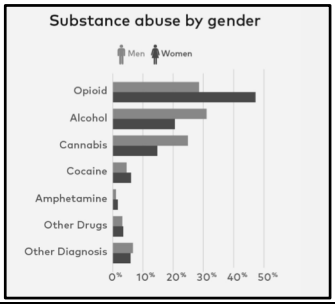
Opioid Misuse During Pregnancy



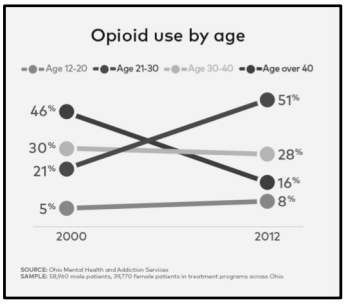
Source: National Institute on Drug Abuse

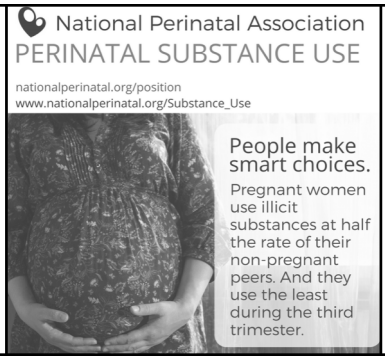
Ohio's children's services agencies overwhelmed by opioid crisis

In Ohio women abuse opioids more than men.

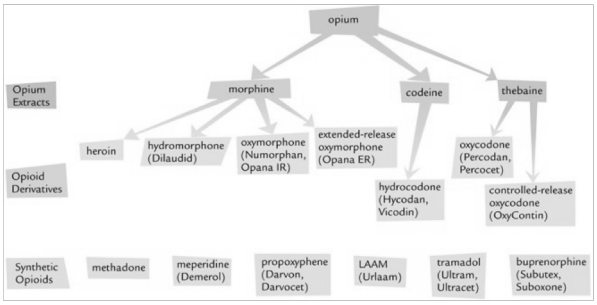


...and they tend to be child-bearing age





II. Understanding opiates – their power, pathways and risks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codeine
thebaine
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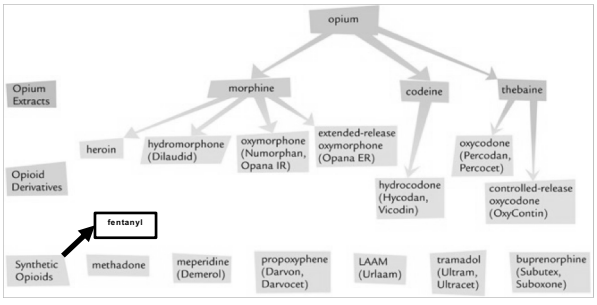
LAAM (Urlaam)
tramadol (Ultram, Ultracet)
buprenorphine (Subutex, Suboxone)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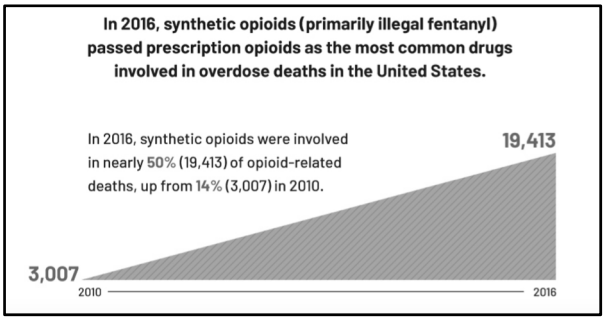
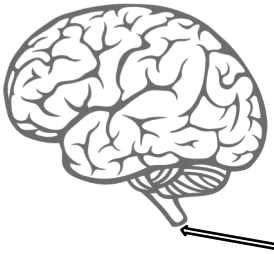

In 2016, synthetic opioids (primarily illegal fentanyl) passed prescription opioids as the most common drugs involved in overdose deaths in the United States.
In 2016, synthetic opioids were involved in nearly 50% (19,413) of opioid-related deaths, up from 14% (3,007) in 2010.
19,413
3,007
2010
2016

Opiates and the Brain

Opiates and the Brain



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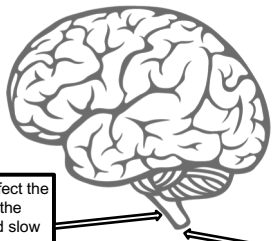

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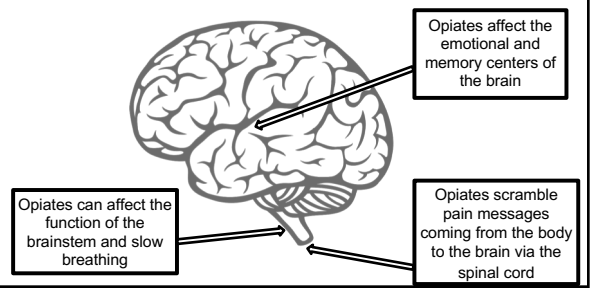

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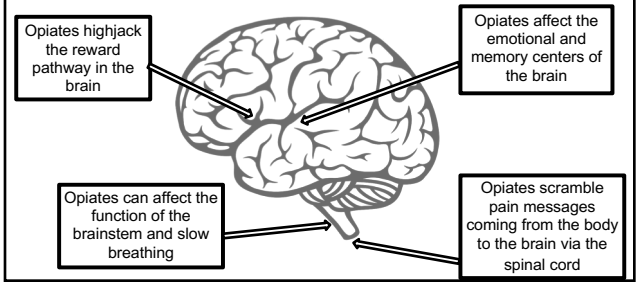
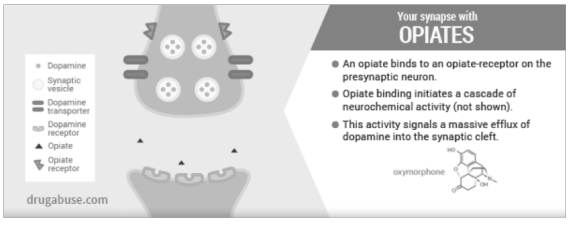


Opiates "push" more dopamine into the reward pathway



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

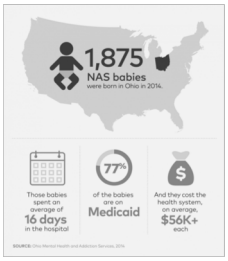
Women who use opiates during pregnancy are also at risk for birth complications. Risks include:

- 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

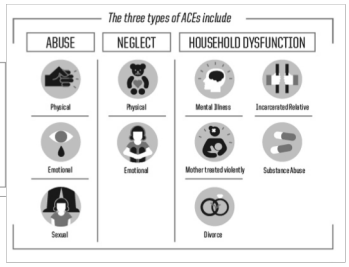
- No consistent pattern of congenital anomalies
- Microcephaly
- Neurobehavioral problems
- Postnatal growth deficiency
- SIDS
- NAS

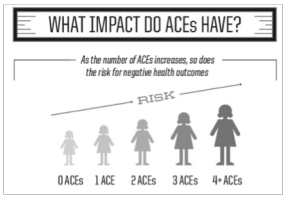


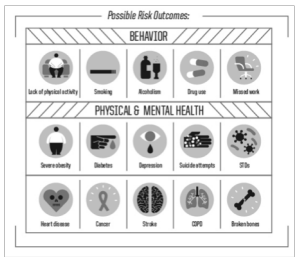
Other Risks: Trauma and Criminalization

What are the other risks? Trauma

ACEs are ADVERSE CHILDHOOD EXPERIENCES







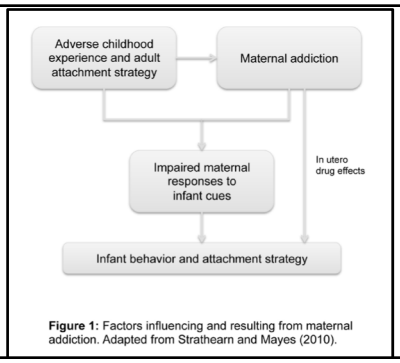
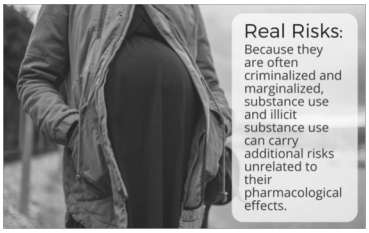


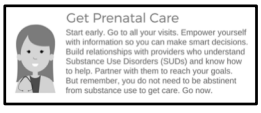
Figure 1: Factors influencing and resulting from maternal addiction. Adapted from Strathearn and Mayes (2010).

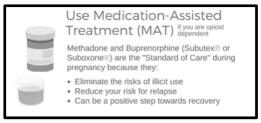
What are the other risks? Criminalization

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



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





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

Miriyala (2018)

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
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- Sweating
- Fever or unstable temperature
- Hypersensitivity to stimulation (light, sound, handling)

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Finnegan Neonatal Abstinence Scoring Tool (FNAST)

Patient ID: Name: Today's Weight: DOB: Date:

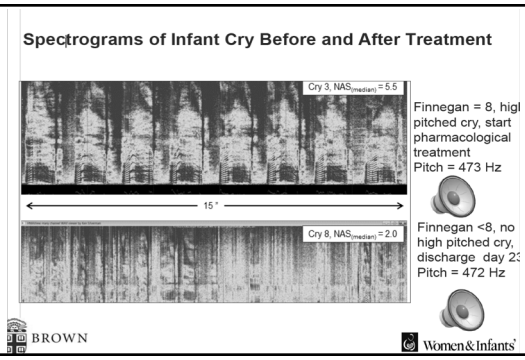
Signs & Symptoms	Score
Central Nervous System Disturbances	
Crying: Excessive High Pitched	2
Crying: Cont. High Pitched	3
Sleeps < 1 Hr After Feeding	3
Sleeps < 2 Hr After Feeding	2
Sleeps < 3 Hr After Feeding	1
Hyperactive Moro Reflex	2
Markedly Hyperactive Moro Reflex	3
Mild Tremors: Disturbed	1
Mod-Severe Tremors Disturbed	2
Mild Tremors: Undisturbed	3
Mod-Severe Tremors Undisturbed	4
Increased Muscle Tone	2
Excoriation (Specific Area)	1
Myoclonic Jerk	3
Generalized Convulsions	5
Metabolic, Vasomotor And Respiratory Disturbance	
Sweating	1
Fever < 101 (37.2-38.3c)	1
Fever > 101 (38.4c)	2
Frequent Yawning (> 3)	1
Mottling	1
Nasal Stuffiness	1
Sneezing (>3)	1
Nasal Flaring	2
Respiratory Rate (> 60/Min)	1
Respiratory Rate (>60/Min With Retractions)	2
Gastrointestinal Disturbances	
Excessive Sucking	1
Poor Feeding	2
Regurgitation	2
Projectile Vomiting	3
Loose Stools	2
Watery Stools	3
Score	
Total Score	
Average Daily Score	
Inter-Observer Reliability %	
Initials Of Scorer 1	
Initials Of Scorer 2	

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

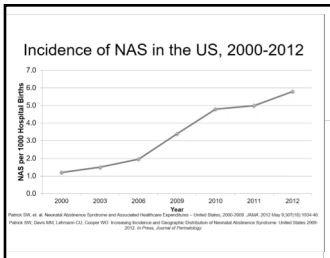
"When the infant is unable to decease crying within a 15 second period.. or if the infant continues to cry intensely or continuously for up to 5 minutes … if these signs are present this item (excessive high pitched cry) should be scored whether the infant's cry is high pitched or not."

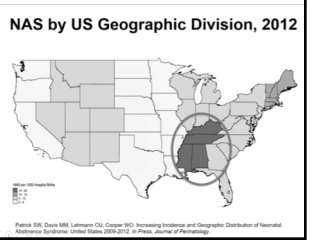


Myoclonic Jerk

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 1D: Drug Abuse and Dependence Diagnoses at Time of Delivery

Setting: Inpatient (all)
Location: Ohio Hospitals
People: Ohio Residents
Age: All
Query Codes: MSDRGs 765-768 and 774,775 (Vaginal Deliveries and C-Sections)
*See Codes Tab for ICD-9 and ICD-10 Codes (Could be in primary or 18 secondary dx fields.)

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Marijuana	1,295	1,434	1,422	1,514	1,557	1,556	1,941	2,150	2,447	2,061
Opioid	302	382	455	600	778	1,010	1,303	1,609	1,910	1,949
Cocaine	718	690	544	404	337	359	356	323	343	332
Other (Amphetamine Psychostimulant, Hallucinogens and Sedatives)	81	94	99	93	89	100	109	140	131	137
Total Number Delivering Mothers Diagnosed with Dependence**	2,068	2,250	2,194	2,301	2,467	2,704	3,298	3,777	4,353	4,013

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Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Marijuana	1,295	1,434	1,422	1,514	1,557	1,556	1,941	2,150	2,447	2,061
Opioid	302	382	455	600	778	1,010	1,303	1,609	1,910	1,949
Cocaine	718	690	544	404	337	359	356	323	343	332
Other (Amphetamine Psychostimulant, Hallucinogens and Sedatives)	81	94	99	93	89	100	109	140	131	137
Total Number Delivering Mothers Diagnosed with Dependence**	2,068	2,250	2,194	2,301	2,467	2,704	3,298	3,777	4,353	4,013

NAS Hospitalizations in OH (2006- 2015)

Table 1A: Hospitalizations* for Neonatal Abstinence Syndrome

Setting: Inpatient (all)
Location: Ohio Hospitals
People: Ohio Residents
Age: <1
Query Codes: ICD-9: 779.5; ICD10: P96.1 (NAS-Could be in primary or 18 secondary dx fields.)

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Inpatient discharge*	305	369	477	715	953	1,172	1,482	1,717	1,919	2,174
Medicaid Discharge	222	288	369	583	811	998	1,322	1,502	1,741	1,950
Non-Medicaid Discharge	83	81	108	132	142	174	160	215	178	224
Average LOS (days)	16	19.5	20.1	19.6	18.9	16.37	17.73	15.19	14.9	13.9
Total LOS (days)	4,892	7,200	9,580	14,006	17,965	19,181	21,834	26,085	28,580	30,153
Average charge	$39,561	$59,033	$59,580	$72,158	$64,911	$59,847	$57,813	$61,469	$68,666	$61,371
Total charge	$12,066,087	$20,982,542	$28,419,546	$51,592,956	$61,860,258	$70,140,821	$85,678,946	$105,542,816	$131,770,486	$133,138,341

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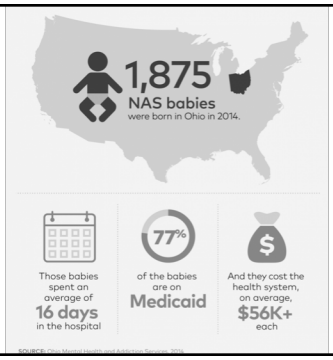

Health Outcomes in OH (2015)

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

Setting: Inpatient (all)
Location: Ohio hospitals
People: Ohio Residents
Age: <1
Query Codes: MSDRG 789-795 (Neonates and Newborns)
ICD-9 779.5 (NAS) *Could be in primary or 18 secondary dx fields
*See Codes Tab for ICD-9 and ICD-10 Codes (Could be in primary or 18 secondary dx fields.)
*Divide each group by the total number of NAS infants to get %

	2015	
Health Outcomes	**NAS infants (%)**	**All Infants (%)**
Feeding Difficulties	16.45	5.36
Low Birth Weight	19.63	9.99
Respiratory Symptoms	21.03	9.46
Seizures and Convulsion	0.79	0.19

Health Outcomes in OH (2015)

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

Setting:	Inpatient (all)
Location:	Ohio hospitals
People:	Ohio Residents
Age:	<1
Query Codes:	MSDRG 789-795 (Neonates and Newborns)
	ICD-9 [redacted] (NAS) *Could be in primary or 18 secondary dx fields
	*See [redacted] tab for ICD-9 and ICD-10 Codes (Could be in primary or 18 secondary dx fields.)
	*Divi[redacted] group by the total number of NAS infants to get %

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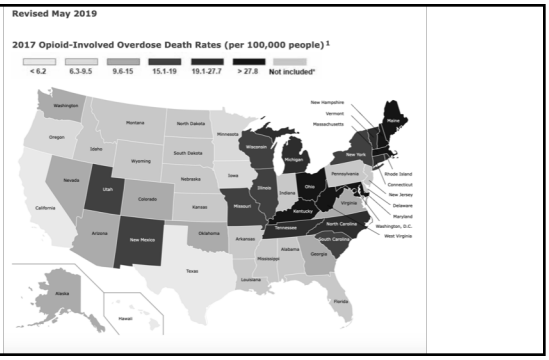
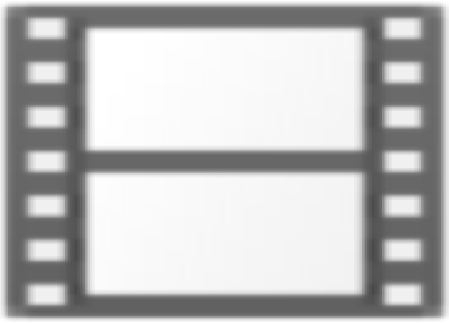


State Opioid-Involved Overdose Death Rates and Opioid Prescribing Levels

State	Opioid-Involved Overdose Deaths/100,000 persons [1] (2017)	Opioid Prescriptions/100 persons [2] (2017)
West Virginia	49.6	81.3
Ohio	39.2	63.5
Washington D.C.	34.7	28.5
New Hampshire	34.0	52.8
Maryland	32.2	51.7
Maine	29.9	55.7
Massachusetts	28.2	40.1
Kentucky	27.9	86.8



Infants with NAS Video

- https://www.cbsnews.com/news/life-begins-with-agony-of-withdrawal-for-opiate-addicted-babies/

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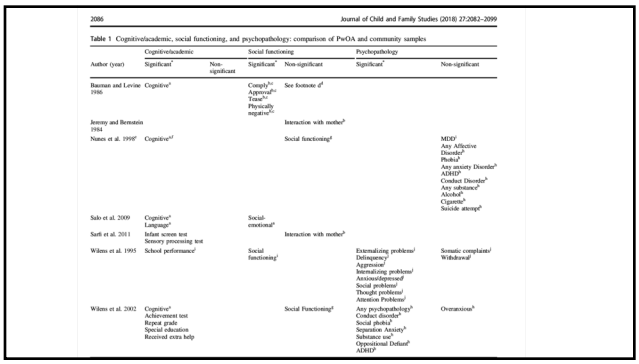
Child Effects

- *"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

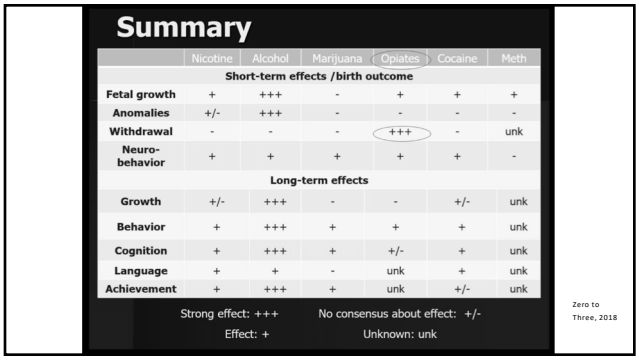
Paris and Sommer (2015)



2086 Journal of Child and Family Studies (2018) 27:2082–2099

Table 1 Cognitive/academic, social functioning, and psychopathology: comparison of PwOA and community samples

	Cognitive/academic		Social functioning		Psychopathology	
Author (year)	Significant[a]	Non-significant	Significant[a]	Non-significant	Significant[a]	Non-significant
Bauman and Levine 1986	Cognitive[b]		Comply[b,c] Approval[b,c] Tease[b,c] Physically negative[b,c]	See footnote d[d]		
Jeremy and Bernstein 1984				Interaction with mother[b]		
Nunes et al. 1998[e]	Cognitive[e,f]			Social functioning[g]		MDD[f] Any Affective Disorder[f] Phobia[f] Any anxiety Disorder[b] ADHD[b] Conduct Disorder[b] Any substance[b] Alcohol[b] Cigarette[b] Suicide attempt[b]
Salo et al. 2009	Cognitive[a] Language[a]		Social-emotional[a]			
Sarfi et al. 2011	Infant screen test Sensory processing test			Interaction with mother[b]		
Wilens et al. 1995	School performance[f]		Social functioning[f]		Externalizing problems[f] Delinquency[f] Aggression[f] Internalizing problems[f] Anxious/depressed[f] Social problems[f] Thought problems[f] Attention Problems[f]	Somatic complaints[f] Withdrawal[f]
Wilens et al. 2002	Cognitive[a] Achievement test Repeat grade Special education Received extra help			Social Functioning[g]	Any psychopathology[b] Conduct disorder[b] Social phobia[b] Separation Anxiety[b] Substance use[b] Oppositional Defiant[b] ADHD[b]	Overanxious[b]



Summary

	Nicotine	Alcohol	Marijuana	Opiates	Cocaine	Meth
Short-term effects /birth outcome						
Fetal growth	+	+++	-	+	+	+
Anomalies	+/-	+++	-	-	-	-
Withdrawal	-	-	-	+++	-	unk
Neuro-behavior	+	+	+	+	+	-
Long-term effects						
Growth	+/-	+++	-	-	+/-	unk
Behavior	+	+++	+	+	+	unk
Cognition	+	+++	+	+/-	+	unk
Language	+	+	-	unk	+	unk
Achievement	+	+++	+	unk	+/-	unk

Strong effect: +++ No consensus about effect: +/-
Effect: + Unknown: unk

Zero to Three, 2018

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 Peisch[1] · Alexandra D. Sullivan[1] · Nicole Lafko Breslend[1] · Renee Benoit[1] · Stacey C. Sigmon[1] · Greg L. Forehand[2] · Jessica Strolin-Goltzman[1] · Rex Forehand[1]

Published online: 29 March 2018

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 intervention programs with these caregivers. 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 a 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 2 Positive and negative parenting behaviors: comparison of PwOA and community samples

	Positive behaviors		Negative behaviors	
Authors (year)	Significant*	Non-significant	Significant*	Non-significant
Bauman and Levine 1986		See footnote a[a]	Command negative[b] Disapprove[b] Humiliate[b] Command[b]	See footnote a[a]
Hans et al. 1999	Sensitive responsiveness[b]	Encouragement/ guidance[b] Accepting[c]	Harsh negativity[b]	Rejecting[c]
Jeremy and Bernstein 1984		Sustain infant involvement[b]		
McMahon et al. 2007[d]		Positive parenting[e]		Negative parenting[e]
Perry et al. 2015		Sensitivity[b] Structuring[b] Non-intrusiveness[b] Non-hostility[b] Reflective functioning[f, g]		
Salo et al. 2009[h]	Sensitivity[b] Nonhostility[b]	Structuring[b] Non-intrusiveness[b]		
Sarfi et al. 2011	Maternal interaction[b, i]			
Suchman and Luthar 2000	Involvement[c] Autonomy granting[c]	Limit setting[c]		

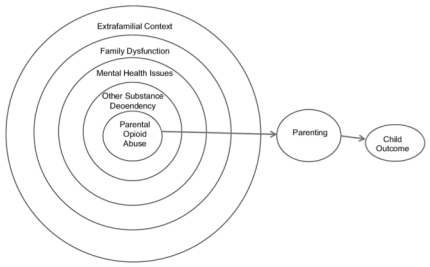
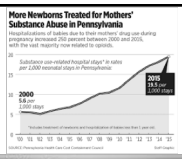


Fig. 2 The context of parental opioid abuse, parenting, and child outcome

Relationships are the "active ingredients" of the environment's influence on healthy human development

National Scientific Council on the Developing Child: Harvard University (2009)

infant-mother relationships and opioids



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

- Mom's with SUDs are more likely to demonstrate
  - 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 placement.
- Other challenges such as mental illness, domestic violence, unemployment, housing instability

…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)

Paris and Sommer (2015)

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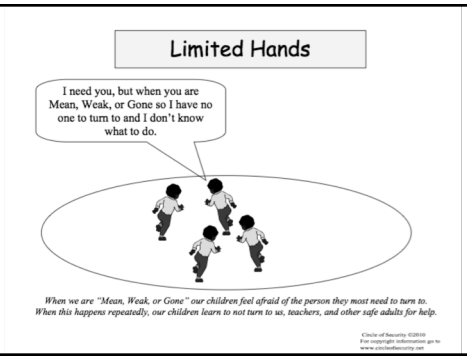
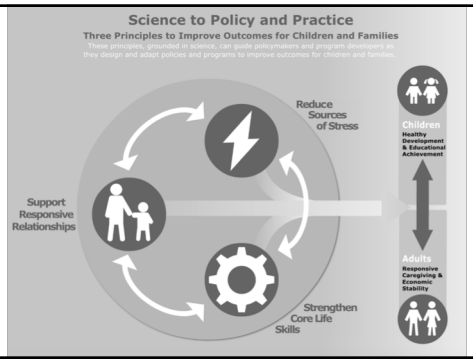
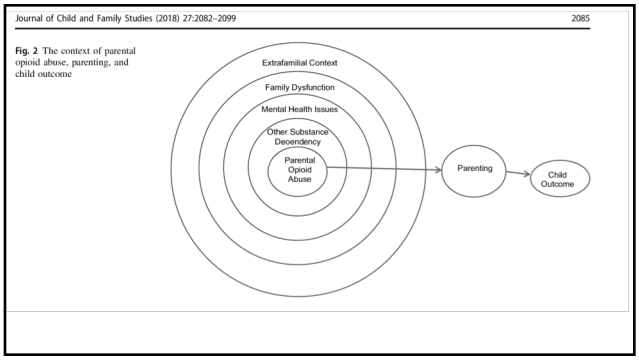


Parenting and the Neurobiology of Addiction

- 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.

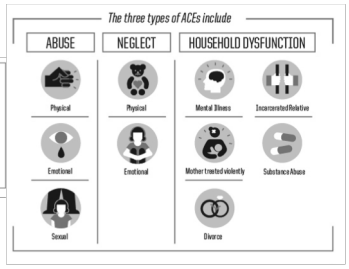
Paris and Sommer (2015)





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

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- National Center on Substance Abuse and Child Welfare https://ncsacw.samhsa.gov
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END

Thank you