

# Associations Between Infant Sleep & Postpartum Maternal-Infant Bonding Among Mothers with Opioid Use Disorder

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## Background

- Infant sleep difficulties negatively impact maternal mental health, maternal sleep quality, and the bonding experience
- Bonding is especially important among postpartum individuals with opioid use disorder as this population is associated with impaired caregiving & reduced maternal behaviors
- Opioid-exposed neonates are reported to have greater sleep deprivation, disorganization, and fragmentation

**Hypothesis:** Poor infant sleep is associated with lower levels of maternal-infant bonding among people with OUD

## Methods

### Study Design

- Retrospective cohort study
- Recruited from multiple clinics throughout Ohio
- Inclusion criteria:
  - >18 years old
  - Between 6-24 months postpartum
  - Received medications for OUD (methadone, buprenorphine) at any point during pregnancy

### Survey Design

- Survey co-designed by individuals with lived experience of OUD during pregnancy
- Maternal-infant characteristics
- Postpartum experiences
- Postpartum Bonding Questionnaire (PBQ)
  - Higher score indicate bonding impairment
  - Subscales:
    1. Impaired bonding
    2. Rejection of infant and pathological anger
    3. Infant-focused anxiety
    4. Incipient abuse

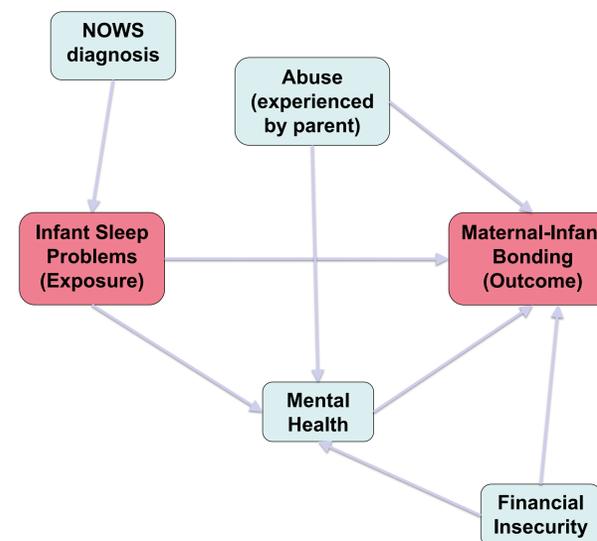
### Statistical Analysis

- Chi-square analysis to detect characteristics and experiences that had strong associations with a total PBQ score in the top quartile (poor bonding)
- Literature search and concept mapped (DAG) to determine covariates and mediators (Figure 1)
- Unadjusted and stepwise linear adjusted regression models used to calculate mean effect ( $\beta$ ) and 95% confidence intervals

## Results

- Out of 100 study participants, 91 completed the PBQ survey
  - 57% reported that their baby's sleep was a problem during the first 6 months postpartum
  - Those who reported infant sleep problems scored 10.40 points higher on the PBQ than those who did not report infant sleep problems (Figure 2)
  - Effect remained after stepwise linear regressions of adjusting for relevant covariates of interest (Figure 1, Table 1)
  - Effect remained when breaking down PBQ score into its 4 subscales: impaired bonding, rejection, and anxiety were all increased with infant sleep problems (Table 2)
- Those who did report sleep problems, the increase in PBQ score was only significant if sleep problems persisted after 1 month after birth (Table 3)

**Figure 1. Directed Acyclic Graph of Exposure, Outcome, and Covariates of Interest**



**Table 1. Unadjusted and Adjusted Models between Infant Sleep Problems and Total PBQ Score**

Variable	Model 1 $\beta$ (95% CI)	Model 2 $\beta$ (95% CI)	Model 3 $\beta$ (95% CI)	Model 4 $\beta$ (95% CI)	Model 5 $\beta$ (95% CI)
Infant Sleep Problems <sup>1</sup>	10.40 (5.83, 14.96) *	9.90 (5.04, 14.76) *	9.15 (4.24, 14.05) *	9.03 (4.10, 13.96) *	8.95 (3.93, 13.97) *
NOWS diagnosis <sup>2</sup>		4.34 (-0.49, 9.17)	3.36 (-1.55, 8.27)	3.55 (-1.44, 8.54)	3.53 (-1.50, 8.56)
Financially Insecure <sup>3</sup>			5.03 (-0.09, 10.16)	4.06 (-1.32, 9.44)	3.87 (-1.87, 9.60)
Abuse <sup>4</sup>				4.33 (-1.78, 10.44)	4.24 (-1.98, 10.45)
Mental Health <sup>5</sup>					0.73 (-6.28, 7.74)

<sup>1</sup>Model 1 is an unadjusted linear regression between self-reported infant sleep problems and total PBQ score. Subsequent models added covariates of interest that are all adjusted for one another in each model.  $\beta$  is the average difference in total PBQ score between those who reported the stated variable and those who did not

<sup>2</sup>Neonatal opioid withdrawal syndrome (NOWS) diagnosis was based on self-report. Of 46 infants diagnosed with NOWS, 28 (60.9%) were sent to the NICU. Of 45 infants not diagnosed with NOWS, 10 (22.2%) were sent to the NICU.

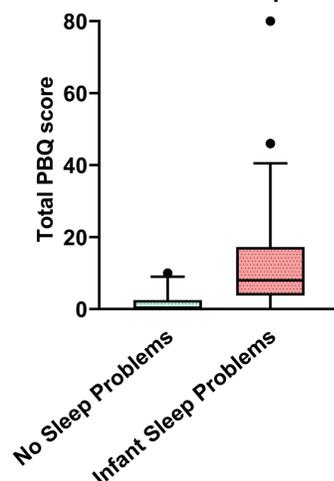
<sup>3</sup>Financially insecure was a composite score that included self-reported worrying about paying for food/shelter, housing insecurity, engaging in sex work, inability to find help with childcare, and needing to buy medications for OUD elsewhere.

<sup>4</sup>Abuse was a composite score of self-reported physical and emotional abuse. All who reported physical abuse had also reported emotional abuse.

<sup>5</sup>Mental health was a composite score of self-reported depression, anxiety, and "other mental health" symptoms.

\*p-value < 0.001

**Figure 2. Comparison of Total PBQ Score Between Infant Sleep Problems**



**Table 2. Mean Increase in PBQ Subscale Scores based on Infant Sleep Problems at 6 Months Postpartum**

	$\beta$ , SD	CI	p-value
<b>PBQ Total</b>	10.40 $\pm$ 2.30	(5.83, 14.96)	>0.001*
<b>PBQ Bonding</b>	4.68 $\pm$ 1.06	(2.57, 6.78)	>0.001*
<b>PBQ Rejection</b>	2.65 $\pm$ 0.73	(1.19, 4.10)	>0.001*
<b>PBQ Anxiety</b>	2.94 $\pm$ 0.52	(1.92, 3.97)	>0.001*
<b>PBQ Abuse</b>	0.08 $\pm$ 0.24	(-0.39, 0.55)	0.742

**Table 3. Mean Increase in Total PBQ Score based on Infant Sleep Problems at 1 Month vs. 1+ Month**

Infant Sleep Problem	$\beta$ , SD	CI	p-value
$\leq$ 1 month (n = 10)	6.20 $\pm$ 4.21	(-2.16, 14.55)	0.144
$\geq$ 1 month (n = 47)	11.20 $\pm$ 2.40	(6.45, 15.94)	>0.001*

\*Referent group was "infant sleep was never a problem"

## Conclusions

- In this pilot study among postpartum individuals with OUD, those who reported difficult sleep problems had higher scores of impaired bonding, even after adjusting for several factors of interest
- Improving infant sleep may yield increased maternal-infant bonding in families with OUD
- Future studies should increase the sample size and include observational and interview-based mixed methods

## Clinical Relevance

Given the importance of infant sleep on maternal mental health and maternal-infant bonding, and the increased prevalence of infant sleep problems among infants with opioid exposure, sleep education should be more strongly considered when counseling new parents with OUD.

## References

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