Examining the Association between Maternal Postpartum Stress and Infant Non-Nutritive Suck

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Background and Purpose

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Maternal Stress

- Maternal prenatal stress and its impact on child development has been well documented. It is a known risk factor for adverse child outcomes (e.g. cognition, motor development, speech-language development, socio-emotional development, behavior problems) (Simcock et al., 2017; Brouwers et al., 2001; Pierce, 2021).
- Further, there is a strong body of literature showing associations between maternal postpartum depression and the impacts on infant physical health, sleep, motor and cognitive development, as well as mother-infant bonding (Slomain et al., 2019).
- However, few studies have explored **maternal *postpartum* stress** and child outcomes.

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Non-nutritive suck (NNS)

- One way to assess the impact of postpartum stress on infant neurofunction is through a NNS sample.
- Burst-pause pattern where each burst contains ~6-12 suck cycles and has a within-burst frequency of 2 Hz (Wolff, 1968).
- Controlled by brainstem interneurons and can be altered by experiences, deprivations, or sensory stimulation (Barlow et al., 2012; Estep et al., 2008; Zimmerman & DeSousa, 2018).

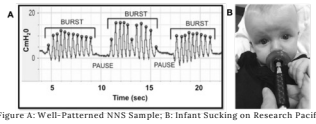

Figure A: Well-Patterned NNS Sample; B: Infant Sucking on Research Pacifier

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Purpose

Aim

- To examine the relationship between maternal postpartum perceived stress and infant NNS both sampled at 3 months postpartum.

Hypothesis

- We hypothesized that higher postpartum maternal perceived stress would be associated with fewer, but longer NNS bursts as was found in our prenatal research (Zimmerman et al., 2021).

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Methods

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Non-nutritive suck (NNS)

- A suck sample was obtained in the home at 3 months (±2 weeks).
- Caregivers held the infant in a cradle hold in one hand and offered the pacifier with the other for a total of five minutes.

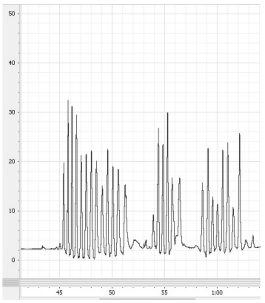

Figure: Example of 3-month NNS signal

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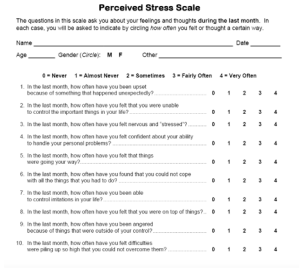
Perceived Stress Scale (PSS-10)

- Mothers reported on their current perceived stress using the PSS-10 (Cohen, 1994).
- The PSS-10 consists of 10 questions rated on a 4-point Likert scale (0=never to 4=very often).
- Questions center around specific feelings and beliefs the respondent may have experienced in the last month.
- Responses to each question are summed and range from 0 to 40; indicating low (<14), moderate (14-26), or high (>26) perceived stress.



Perceived Stress Scale

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate by circling how often you felt or thought a certain way.

Name _____ Date _____

Age _____ Gender (Circle): M F Other: _____

0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often

1. In the last month, how often have you been upset because of something that happened unexpectedly? 0 1 2 3 4
2. In the last month, how often have you felt that you were unable to control the important things in your life? 0 1 2 3 4
3. In the last month, how often have you felt nervous and "stressed"? 0 1 2 3 4
4. In the last month, how often have you felt confident about your ability to handle your personal problems? 0 1 2 3 4
5. In the last month, how often have you felt that things were going your way? 0 1 2 3 4
6. In the last month, how often have you found that you could not cope with all the things that you had to do? 0 1 2 3 4
7. In the last month, how often have you been able to control irritations in your life? 0 1 2 3 4
8. In the last month, how often have you felt that you were on top of things? 0 1 2 3 4
9. In the last month, how often have you been angered because of things that were outside of your control? 0 1 2 3 4
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them? 0 1 2 3 4

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Results

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Results

- 35 mother-infant dyads (60% male).
- Full-term infants with no reported neurological issues or chromosomal anomalies were included.
- On average, NNS was assessed at 3.09 (0.4 SD) months and all had been exposed to a pacifier prior to the study.
- Mothers were, on average, 35 years old (3.84 SD), married (91%), and had a college degree or higher (97%).
- 20 mothers reported low perceived stress, 13 indicated moderate perceived stress, and 2 reported high perceived stress.

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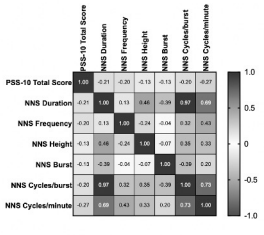
Results

- Bivariate correlations were used to examine the associations between NNS and PSS-10 total score.
- Statistical analyses were performed using Prism Version 10.
- No associations between NNS dependent variables and PSS-10 total score reached significance.
- This is inconsistent with our hypothesis and the prior prenatal study in our lab, which showed higher maternal prenatal perceived stress (measured by PSS-10 total score) was related to fewer NNS bursts per minute (Zimmerman et al., 2021).



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Clinical Implications

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Clinical Implications

- Prior data from our lab showed that maternal *prenatal* perceived stress was associated with NNS burst activity; however, the association with maternal postnatal stress is not significant at this time.
- While the exact mechanism surrounding this association remains unknown, prior research suggests that maternal stress can impact an infant's central nervous system beginning prenatally and through the early parts of the child's life (Merced-Nieves et al., 2020, Merced-Nieves et al., 2021).
- Recruitment for this study is ongoing.
  - We anticipate a sample of 80 total participants at study completion.
  - We will continue to examine this association to see if similarities between prenatal and postnatal associations with NNS emerge with a larger sample size.
  - A logical next step would be to study mother-infant dyads longitudinally from pre- to postpartum to study these trends in the same cohort.
- Clinically, feeding therapists who work with young infants should consider the mother's *prenatal* stress as one aspect that may influence early sucking (Zimmerman et al., 2021).

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THANK YOU

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