Prenatal Parental Reflective Functioning Predicts Atypical Maternal Brain Responses to Hearing Own- Versus Other-Baby Cries Among Trauma-Exposed Mothers

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Introduction

- Parental reflective functioning (RF), or mentalizing, refers to the capacity of parents to understand their child’s mental states and draw accurate conclusions about their children’s knowledge, thoughts, and feelings (Slade, 2005).

- The precuneus is associated with mentalizing about the emotions and intentions of oneself and others (Atique et al., 2011) and is activated when a mother hears infant cries (Kim et al., 2011).

- An intervention focused on increasing reflective capacity increased child-focused responses in the precuneus and its functional connectivity with subgenual anterior cingulate cortex during a baby cry task (Swain et al., 2017).

- More research is needed to better understand brain-behavior associations among parents and the sequelae of stress and trauma on the parent-child relationship.

- In the present study, it was hypothesized that parental reflective functioning among trauma-exposed mothers would predict differential brain responses, particularly in areas like the precuneus.

Method

**Participants**

- Age: Mean = 26 yrs; Range = 19-39; SD = 6.1
- Monthly Family Income: Median = $1200
- 100% received services from WIC and 93% had public health insurance
- Education: Some college = 50%, High school or less = 21%, College or graduate degree = 29%
- Family status: Single parents = 93%, First-time mothers = 21%

**Procedures**

A subsample of 14 women from a larger prospective, longitudinal study on parenting beginning in the third trimester of pregnancy were included. Participants were originally interviewed during pregnancy, and again at 3-, 12-, 24-, and 36-months postpartum. The subsample of mothers were selected based on their high disorganization/disruption scores during pregnancy on the Working Model of the Child Interview (WMCI; Zeanah et al., 1986); they were re-interviewed at approximately 5-years postpartum, where they completed self-report measures and a videotaped play interaction with their child, followed by a 90-minute neuroimaging lab visit.

**Table 1. Rates of Abuse Endorsed by Participants**

<table>
<thead>
<tr>
<th>Type of Abuse</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Childhood Emotional Abuse</td>
<td>57%</td>
</tr>
<tr>
<td>Childhood Physical Abuse</td>
<td>71%</td>
</tr>
<tr>
<td>Childhood Sexual Abuse</td>
<td>57%</td>
</tr>
<tr>
<td>Intimate Partner Violence (lifetime)</td>
<td>86%</td>
</tr>
</tbody>
</table>

Results

- Parental RF and disorganized/disrupted caregiving scores on the WMCI were not significantly correlated ($r = 0.096, p = 0.754$). These were entered as regressors into a general linear model (GLM) using statistical parametric mapping software (SPM8).

- Results showed that mothers’ RF scores during pregnancy predicted own > other baby-cry differential responses in the precuneus (peak at [6, -38, 48] in MNI coordinates, $k = 56$ voxels, s.v.c. corrected at $p = 0.05$), suggesting that greater levels of parental RF significantly predicted increasing differential responses in areas of the brain associated with social cognition and mentalizing, when hearing their own-baby cry compared to hearing an other-baby cry (see Figure 3).

Discussion

- The current study examined prenatal parental RF as a predictor of neural activity in the precuneus 5 years later among mothers who reported high rates of childhood abuse and intimate partner violence during their lifetime.

- Observed parental reflective functioning in pregnancy may have a neural basis in an area of the brain associated with empathy and mentalization.

- Lower levels of parental reflective functioning may lead to a blunted (atypical) response to own-baby distress cues in the precuneus among mothers with significant histories of abuse in child- and adulthood.

- Therefore, early interventions aimed at improving parental reflective functioning in trauma-exposed mothers may contribute to changes in areas of the brain associated with mentalization, and serve to improve the parent-child relationship, with recent research lending support to the importance of such an intervention (Swain et al., 2017).

- The current study is one of the first to examine relationships between brain activity and coded parental reflective functioning, particularly among mothers with significant histories of interpersonal trauma.

- Limitations of the current study include a small sample size, suggesting that results should be interpreted with caution. Additional analyses using larger samples are needed to determine if the results of the present study can be replicated.

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