Phenotypic and Genetic Characteristics of Perinatal Depression

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UNC Center for Women’s Mood Disorders
Goals of Talk

• Phenotyping of perinatal psychiatric illness
• Pathophysiology
• PACT International Consortium
• Heritability of PPD
• Novel Treatments
Disclosures

• NIH R01MH104468, R01MH095992, R01 HD073220-01
• NC TraCS
• Foundation of Hope
• Sanders Clinician Scholar
• Sage Pharmaceuticals
Perinatal depression is common, morbid and often missed.

Climbing Out of the Darkness of Maternal Mental Illness

By KJ DELL'ANTONIA JUNE 16, 2014 NYT
“Postpartum depression isn’t always postpartum. It isn’t even always depression. A fast-growing body of research is changing the very definition of maternal mental illness, showing that it is more common and varied than previously thought.”
Background: Perinatal Depression

➢ **COMMON**
  • 10-15% prevalence
  • Most common, unrecognized complication of perinatal period

➢ **MORBID**
  • Devastating consequences for patient and family
    • low maternal weight gain, preterm birth
    • Impaired attachment between mother and infant
    • Increased risk of suicide and infanticide

➢ **MISSED**
  • Inconsistent use of practice guidelines and routine screening
  • Symptoms often different from “classic DSM depression”

➢ **HETEROGENEOUS– TIMING OF ONSET & SYMPTOM PRESENTATION**
Postpartum depression: a disorder in search of a definition

Katherine L. Wisner • Eydie L. Moses-Kolko • Dorothy K. Y. Sit
Distinguishing Characteristics of Mood Symptoms in the Perinatal Period

- Anxiety or agitation
- Depressed mood
- Sadness, weepiness
- Irritability
- Lack of interest in the newborn
- Impaired concentration or feeling overwhelmed
- Feelings of dependency
Barriers to Diagnosis & Treatment

Study Links Autism With Antidepressant Use During Pregnancy

If you were prescribed Zoloft® while you were pregnant and gave birth to a baby with a congenital heart defect, persistent pulmonary hypertension of the newborn (PPHN), an abdominal defect, a cranial defect, or any other type of birth defect, we can help you.
The Many Faces of Perinatal Depression
Ms. B’s Thoughts

“It enters my mind with a power I cannot fight. It comes quick and unexpected. The baby we planned, the baby I fervently desired, the child I love is jolted from my arms and crashing to the floor...my newborn baby is thrown over the upstairs balcony. Somehow I have let go of her. I can see her as she falls. She hits the ceiling fan and spins across the room. She slams into the slate tile.”

“Why am I having these thoughts? Why am I such as horrible mother? Each time I walk through the hallway by the stairs I squeeze her tight to me. She will not fall. I am so worried though.”

“I see scissors sticking out of the soft spot in her head. I don’t know how they got there. I have thrown away all our scissors.”
Postpartum Psychosis

- A rare condition, with an estimated prevalence of 0.1%-0.2% (one to two per thousand)
  - However, in women with Bipolar Disorder, the risk is 100 times higher at 10% - 20%
  - It is a psychiatric emergency & requires immediate treatment with a mood stabilizer & antipsychotic
- Onset usually 2-3 days postpartum
- Has a 5% suicide & 4% infanticide rate
- Risk for recurrent episode with a subsequent pregnancy is high

Suicide is the second leading cause of death in postpartum women
Questions and Controversies

• What is the role of childbirth as a specific trigger for the onset of depression?

• What is the pathophysiology?

• Is PPD a distinct disorder or part of major depressive disorder (MDD)?

• Should the diagnostic criteria for PPD be specific for the postpartum period or should criteria be extended to include symptom onset during pregnancy?
Risk of Postpartum Psychiatric Episodes and When?

Adjusted for age and calendar time. Psychiatric disorders: all diagnosis

Reference group: Mothers who gave birth 11 months prior.

Major Depression (MDD) is Heterogeneous

- **MDD**: heterogeneous in both genetics and other biology
- Complicates efforts to find biomarkers and genetic associations
- **PPD**: may offer many advantages as a more homogenous subgroup of MDD
Advantages of PPD

• One sex
• Reproductive aged women
• Exposure to the same biopsychosocial event
• Linked to a puerperal endocrine trigger
• Practical to identify and recruit study subjects
• Large sample sizes are available
• Repeat measures are doable
Normal changes in the HPA axis during pregnancy and into the postpartum period

- The third trimester of pregnancy is characterized by high estrogen and progesterone levels and a hyperactive HPA axis with high plasma cortisol.

- At childbirth and during the transition to the postpartum period the following occur:
  - estrogen and progesterone rapidly decline
  - there is blunted HPA axis activity due to suppressed hypothalamic CRH secretion
Mean plasma concentrations of estrone (E1), estradiol (E2), estriol (E3), and progesterone (P) during pregnancy. (Data from Tulchinsky D, et al 1972; Levitz M et al 1977;35:109.)
Precipitous Drop in Hormones at Birth
PACT -- Postpartum Depression: Action Towards Causes and Treatment

• Impetus for PACT
  • strong belief in common goal
  • identifying biomarkers of susceptibility is achieved by a large-scale collaborative effort

• Long-term goal
  • international consortium focused on elucidating the causes of postpartum psychiatric illness
Creation of PACT

• Collaborative spirit! Formed in 10/10 at Marce meeting in Pittsburgh

• Modeled on principles of the highly successful Psychiatric Genomics Consortium (PGC)

• Democratic and inclusive consortium open to all who agree to operating principles

• All effort is donated, and there are no entry fees
Genomewide Association Studies (GWAS) in Major Depression

- Genetic approaches have worked well for autism, bipolar disorder and schizophrenia but poorly for MDD
- Candidate gene studies of MDD have had poor replication in GWAS studies
- The heterogeneity of MDD has been a problem and PPD may offer a path to understanding
**PACT: Members and Process**

- **PACT**: Members are from 25 institutions in 8 countries. Comprehensive phenotypic data on ~17,912 unique subject records of women with PPD was submitted by 19 PACT sites.

- **PACT** MOU details intellectual property, authorship, and rules of conduct

- **PACT** committees include the executive/coordinating and phenotype groups
### PACT Supplement Table 1

**Study Site Locations, Collaborators, Design and Records Submitted**

<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>Collaborators</th>
<th>Study Designs Submitted</th>
<th>Records Submitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>U of Melbourne</td>
<td>Buist, A., Bilata, I. *</td>
<td>Prospective</td>
<td>Single</td>
</tr>
<tr>
<td>France</td>
<td>Univ of Paris</td>
<td>Apar, G., Davouche, E.</td>
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<td>Sweden</td>
<td>Karolinska</td>
<td>Magnusson, P., Lichtman, P.</td>
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<tr>
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<td>VU University Medical Center</td>
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<td>Retrospective</td>
<td>Single</td>
</tr>
<tr>
<td>The Netherlands</td>
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</tr>
<tr>
<td>UK</td>
<td>Cardiff</td>
<td>Jonet, J.</td>
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<td>USA</td>
<td>U Mass</td>
<td>Deligiannis, K.</td>
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<tr>
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<td>U Penn</td>
<td>Epperson, N.C., Kim, D.</td>
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<td>USA</td>
<td>Medical U of South Carolina</td>
<td>Guilla, C.</td>
<td>Prospective</td>
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<td>USA</td>
<td>UNC</td>
<td>Melner-Brody, S., Sullivan, P.F., Rubinow, D. *</td>
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<tr>
<td>USA</td>
<td>Iowa</td>
<td>O’Hara, M., Stuart, S., Brock, R. L. *</td>
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<td>Repeated</td>
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<td>USA</td>
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<td>Single</td>
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<td>Prospective</td>
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<tr>
<td>USA</td>
<td>NIH/NIMH</td>
<td>Schmidt, P., Martin, P. *</td>
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<td>Single</td>
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<td>Shanky, K.</td>
<td>Prospective</td>
<td>Single</td>
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<td>U of Arkansas/Emory</td>
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<td>Prospective</td>
<td>Repeated</td>
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<td>USA</td>
<td>Northwestern (Pittsburgh)</td>
<td>Winer, K., Heather, E., Dills, J.L., Sit, D. *</td>
<td>Prospective</td>
<td>Repeated</td>
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<tr>
<td>USA</td>
<td>UNC</td>
<td>Putnam, K.T., Biostatistician</td>
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<tr>
<td>Denmark</td>
<td>Aarhus University</td>
<td>Musk-Olsen, T., Epidemiologist</td>
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</tr>
</tbody>
</table>

* Data submitted included study participants across multiple cohorts
PACT Initial Scientific Aim

• Focused on performing rigorous investigation of the heterogeneity of PPD to identify clinical subtypes

• Submission of data was from 9/2012-9/2013

• Finalized operational definitions for cases, controls and quality standards

• Establish harmonization of common elements, core sets of measures, and collection of data across sites
Definition and Phenotypic Heterogeneity

- **Epidemiology**: PPD is common & devastating
- **Definition**: Episode of MDD occurring postpartum
- **Distinguishing characteristics**: Severe anxiety, agitation, & suicidal thoughts
- **Timing of symptom onset**: Do symptoms begin before or after childbirth? Does it matter?
- **Prior Psychiatric Comorbidity**: Anxiety and MDD
- **Pregnancy and Obstetrical Complications**: May play a role in determining PPD onset
Edinburgh Postnatal Depression Scale (EPDS)

- 10-item self-report questionnaire that assesses depressive and anxious symptoms

- The most widely used and validated screening tool for in pregnant and postpartum women
  - Cut off score ≥12 indicates MDD
  - Cut-off ≥10 indicates minor depression that require additional clinical monitoring
## 10 Item Edinburgh Postnatal Depression Scale

<table>
<thead>
<tr>
<th>Item</th>
<th>Question</th>
<th>Often</th>
<th>Sometimes</th>
<th>Hardly Ever</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>How often did you feel able to laugh or see the funny side of things?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>How often were you able to look forward to things with excitement?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>How often did you blame yourself unnecessarily when things went wrong?</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>How often were you anxious or worried for no good reason?</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>How often did you feel scared or panicky for no good reason?</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>How often did you feel overwhelmed?</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>How often were you so unhappy that you had difficulty sleeping?</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>How often did you feel sad or miserable?</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>How often were you so unhappy that you cried?</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>How often did the thought of harming yourself occur to you?</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
Latent Class Analysis (LCA)

• The central premise of LCA is that a heterogeneous group can be reduced to several homogeneous subgroups through evaluating and then minimizing associations among responses across multiple indicator variables.

• LCA techniques cluster similar response profiles for distinct class membership among cases.
Methods

- **Latent Class Analysis (LCA)** was used to identify unobserved heterogeneity in the PACT sample. We used Mplus 7.2 mixed model methods to perform LCA on categorical and continuous data.

- Iterative process
  - LCA 1: Used the 10 EPDS items as indicator variables for all submitted subject records (*cases and controls*)
  - LCA 2: Severity data and other clinical data not included in Step 1 (*cases only*)
Case Definition & Indicator Variables

- **PPD case definition**: EPDS total score $\geq 10$, a HAM-D $\geq 8$ or SCAN interview.

- **Indicator variables** were hypothesized to capture distinguishing clinical features of PPD having commonality among sites
  
  - Depression severity, EPDS total, EPDS anxiety subscale, pregnancy complications, obstetric complications, suicidal ideation, and previous psychiatric history of anxiety and depression.
Identifying PPD phenotypic heterogeneity
A two-tier analysis approach

PACT Unique Subjects
N=17912

Tier 1 LCA
Subjects with complete EPDS Item Data
N=6556

Tier 2 LCA
PPD Case Definition Subjects with Depression Rating Score
N=4245

Subjects Included in Both Tier Analyses
N=2527*
## Phenotypic Characteristics Among LCA 1 Latent Classes

<table>
<thead>
<tr>
<th>Validation Variables N=6556</th>
<th>Class 1 53% N=3484</th>
<th>Class 2 36% N=2342</th>
<th>Class 3 11% N=730</th>
<th>Chi_Sq</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPDS Total</td>
<td>3.27 (2.2)</td>
<td>12.33 (3.5)</td>
<td>20.32 (2.4)</td>
<td></td>
</tr>
<tr>
<td>EPDS Anxiety Subscale (mean/sd)</td>
<td>2.08 (1.6)</td>
<td>4.63 (1.6)</td>
<td>5.88 (1.6)</td>
<td></td>
</tr>
<tr>
<td>PPD Onset</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Pregnancy</td>
<td>10.8</td>
<td>34.3</td>
<td>67.1</td>
<td>$X^2 = 532.6$</td>
</tr>
<tr>
<td>% Post partum</td>
<td>89.2</td>
<td>65.7</td>
<td>32.9</td>
<td>$p &lt; 0.001$</td>
</tr>
<tr>
<td>OB Complications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% No</td>
<td>77.0</td>
<td>73.7</td>
<td>57.0</td>
<td>$X^2 = 80.9$</td>
</tr>
<tr>
<td>% Yes</td>
<td>23.0</td>
<td>26.3</td>
<td>43.0</td>
<td>$p &lt; 0.001$</td>
</tr>
<tr>
<td>Pregnancy Complications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% No</td>
<td>38.1</td>
<td>39.4</td>
<td>71.9</td>
<td>$X^2 = 184.7$</td>
</tr>
<tr>
<td>% Yes</td>
<td>61.9</td>
<td>60.6</td>
<td>28.1</td>
<td>$p &lt; 0.001$</td>
</tr>
<tr>
<td>Mood Disorder History</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% No</td>
<td>52.6</td>
<td>43.2</td>
<td>16.5</td>
<td>$X^2 = 106.5$</td>
</tr>
<tr>
<td>% Yes</td>
<td>47.3</td>
<td>56.8</td>
<td>83.5</td>
<td>$p &lt; 0.001$</td>
</tr>
<tr>
<td>Anxiety Disorder History</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% No</td>
<td>84.7</td>
<td>54.5</td>
<td>38.9</td>
<td>$X^2 = 109.3$</td>
</tr>
<tr>
<td>% Yes</td>
<td>15.3</td>
<td>45.5</td>
<td>61.1</td>
<td>$p &lt; 0.001$</td>
</tr>
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</table>
Phenotypic Frequencies in LCA 2 Latent Classes (N=4245)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Class 1 N=759 18%</th>
<th>Class 2 N=2099 49%</th>
<th>Class 3 N=1388 33%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression Severity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minor</td>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Major</td>
<td>0.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Gravidity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primaparous</td>
<td>0.32</td>
<td>0.24</td>
<td>0.28</td>
</tr>
<tr>
<td>Multiparous</td>
<td>0.68</td>
<td>0.76</td>
<td>0.72</td>
</tr>
<tr>
<td>PPD Onset</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1st Trimester</td>
<td>0.04</td>
<td>0.03</td>
<td>0.13</td>
</tr>
<tr>
<td>2nd Trimester</td>
<td>0.17</td>
<td>0.11</td>
<td>0.27</td>
</tr>
<tr>
<td>3rd Trimester</td>
<td>0.06</td>
<td>0.05</td>
<td>0.15</td>
</tr>
<tr>
<td>0-4 wks PPD</td>
<td>0.54</td>
<td>0.82</td>
<td>0.17</td>
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<tr>
<td>5-8 wks PPD</td>
<td>0.13</td>
<td>0.09</td>
<td>0.07</td>
</tr>
<tr>
<td>8+ wks PPD</td>
<td>0.02</td>
<td>0.06</td>
<td>0.21</td>
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<tr>
<td>Obstetric Complications</td>
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</tr>
<tr>
<td>No</td>
<td>0.74</td>
<td>0.73</td>
<td>0.58</td>
</tr>
<tr>
<td>Yes</td>
<td>0.26</td>
<td>0.27</td>
<td>0.43</td>
</tr>
<tr>
<td>Pregnancy Complications</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>0.33</td>
<td>0.31</td>
<td>0.71</td>
</tr>
<tr>
<td>Yes</td>
<td>0.67</td>
<td>0.69</td>
<td>0.29</td>
</tr>
<tr>
<td>Past History of Anxiety or Mood Disorders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No History</td>
<td>0.14</td>
<td>0.27</td>
<td>0.04</td>
</tr>
<tr>
<td>Anxiety Only</td>
<td>0.04</td>
<td>0.03</td>
<td>0.06</td>
</tr>
<tr>
<td>Mood Only</td>
<td>0.27</td>
<td>0.34</td>
<td>0.30</td>
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<tr>
<td>Anxiety and Mood</td>
<td>0.55</td>
<td>0.36</td>
<td>0.00</td>
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<tr>
<td>Suicidal Thoughts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>0.87</td>
<td>0.8</td>
<td>0.1</td>
</tr>
<tr>
<td>Hardly ever</td>
<td>0.09</td>
<td>0.14</td>
<td>0.08</td>
</tr>
<tr>
<td>Sometimes</td>
<td>0.02</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Yes, quite often</td>
<td>0.01</td>
<td>0.00</td>
<td>0.67</td>
</tr>
<tr>
<td>Mood in Pregnancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressed</td>
<td>0.15</td>
<td>0.14</td>
<td>0.47</td>
</tr>
<tr>
<td>Well</td>
<td>0.37</td>
<td>0.21</td>
<td>0.36</td>
</tr>
<tr>
<td>Unknown</td>
<td>0.48</td>
<td>0.64</td>
<td>0.18</td>
</tr>
<tr>
<td>EPDS Total</td>
<td>10.5</td>
<td>14.8</td>
<td>20.1</td>
</tr>
<tr>
<td>EPDS_Anxiety Subscale</td>
<td>4.4</td>
<td>5.4</td>
<td>5.8</td>
</tr>
</tbody>
</table>
Summary of Results

• Among PPD cases, class 1 had the least severe symptoms (mean EPDS=10.5).

• Class 3 had most severe PPD symptoms--worse mood (mean EPDS=20.1), greater anxiety, onset of symptoms during pregnancy, more obstetrical complications and suicidal ideation.

• Class 2 (mean EPDS=14.8) had less severe symptoms; the majority (62%) endorsed symptom onset within 4 weeks postpartum and had more pregnancy complications.

• Lancet Psychiatry, In Press
Panel: Research in context

Systematic review
Our data were aggregated from the international perinatal psychiatry consortium Postpartum Depression: Action Towards Causes and Treatment (PACT), whose members represent 19 institutions in seven countries. The study was an empirical investigation of the heterogeneity of postpartum depression to identify possible clinical subtypes within a large well characterised dataset. Because diagnostic criteria notably affect the implementation and interpretation of screening, diagnosis, treatment, and research of perinatal mood disorders, it has become important to ensure the empirical validity of phenomenological subtypes of postpartum depression.

Interpretation
We assessed aggregated extant data from 17 912 unique subject records with phenotypic information. We found that postpartum depression is heterogeneous and identified three distinct classes of symptoms. Our findings have important implications for prognosis and tailoring of treatment to individual women with postpartum depression. The features that differentiated groups were timing of onset of symptoms (during pregnancy vs postpartum), severity of symptoms, perinatal complications, and history of a mood disorder. Clinicians should be aware of the heterogeneity of women with postpartum depression. A thorough assessment of history will be necessary to guide clinical and treatment decisions. Our data suggest that the timing of symptom onset is of particular importance, and that mothers whose symptoms begin during pregnancy might be at risk of more severe presentations than those who present in the postpartum period.
Maternal Depression Often Starts Before Giving Birth, Study Says

By PAM BELLUCK  FEBRUARY 2, 2015 6:05 PM  22 Comments

A large new study has documented unexpected links in the timing and severity of symptoms of maternal depression, which could help mothers and doctors better anticipate and treat the condition.
Heritability of PPD

Genetic influences on post-natal depressive symptoms: findings from an Australian twin sample

S. A. TRELOAR, N. G. MARTIN, K. K. BUCHOLZ, P. A. F. MADDEN and A. C. HEATH

From the Queensland Institute of Medical Research, Brisbane, Queensland, Australia; and Department of Psychiatry, Washington University School of Medicine, St. Louis, MO, USA

Retrospective interview and questionnaire data from 838 parous female twin pairs (539 monozygotic, 299 dizygotic)

Genetic factors explained 38% of variance in PNDS (95% confidence interval 26–49%)
The Swedish Twin Registry

• The Swedish Twin Registry at Karolinska Institutet

• Collaboration with Dr. Paul Lichtenstein, Dr. Patrik Magnusson, and Dr. Alexander Viktorin

• Our work together began in 2008, when lifetime EPDS was added to SALTY interview.
Estimating Heritability

\[ A^2 + C^2 + E^2 = 1.0 \]

\( A^2 \) = heritability (genomics)

\( C^2 \) = environmental effect shared between members of twins (ie: parenting, water)

\( E^2 \) = environment specific to each individual person (infection versus abuse)
Tetrachoric Correlation

- Tetrachoric correlation: correlation coefficient describing the relationship between discrete variables and is used in twin modeling.

- Because MZ is greater than DZ it is consistent with a genetic effect.

<table>
<thead>
<tr>
<th></th>
<th>MZ</th>
<th>DZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation R</td>
<td>0.491</td>
<td>0.0988</td>
</tr>
<tr>
<td>SE</td>
<td>0.104</td>
<td>0.1557</td>
</tr>
<tr>
<td>95% CI</td>
<td>(0.287-0.695)</td>
<td>(-0.206-0.404)</td>
</tr>
</tbody>
</table>
Heritability of PPD in STR

- 2321 parous twins in the Swedish twin study using the classical twin-model followed with an extended multivariate sibling design including over 1 million parous female siblings.

- Heritability of PPD was estimated at 54% (95% CI, 35-70%) and demonstrated that the heritability of PPD is higher than that for MDD.

- Alexander Viktorin, Department of Medical Epidemiology and Biostatistics, Karolinska Institutet, Stockholm, Sweden
Conclusions

• Identification of the independent risk factors and phenotypic characteristics that distinguish PND from MDD can provide insight into psychological, biological and genetic vulnerabilities to PND.

• Larger sample sizes are needed to identify a genetic signature.

• The perinatal period presents a window of opportunity to actively screen for lifetime histories of depression, and other important risk factors of psychiatric illness.
Denmark and the population registers

The Danish Civil Registration System
The Danish Register of Causes of Death
The Danish National Health Service Registry
The Danish Cancer Register
The Danish National Prescription Registry
The Danish Psychiatric Central Register (ICD-8 and ICD-10)
The Danish Twin Register
The Danish...
The Background Population
Postpartum psychiatric episodes

Baby blues (50-75%)

Postpartum depression (15%)

Postpartum psychosis (0.1%)
Epidemiological and Genetic Predictors of Postpartum Mood Disorders in Danish Research Register

• **Epidemiology**--evaluate the risk factors for PPD and PP in Danish national registers.

• **Genetic Epidemiology**--the vast majority of Danish citizens can be aggregated into pedigrees – use these unique data to understand the interrelations of PPD and PP with MDD and BIP.

• **Genetic Risk Profile Scores (RPS)**—a direct measure of genetic liability. Integrate the RPS for MDD and BIP with the epidemiologic data to develop a predictive model of who will develop PPD and PP and convert to lifetime BIP.
UNC Center for Women’s Mood Disorders

• Inpatient Perinatal Psychiatry Unit (PPIU)
• Unit Outpatient Services: Evaluation, Medication Management, and Therapy
  • NP embedded in OB High Risk
  • NP embedded in Peds Clinic
  • Satellite Clinic at Rex Hospital
  • Tele med Psychiatry for outlying rural Clinics
• Support group
  • 2nd and 4th Tuesday of each month 6:30-8p-free

• www.womensmooddisorders.org
UNC Center for Women’s Mood Disorders Presents:
Maternal Mental Health Awareness Day
Friday, May 1st, 2015

From 12pm-3pm: Join us in the Women’s Hospital and Neurosciences Hospital Atriums for an exciting afternoon filled with:
- Book signing by Walker Karraa, Phd: *Transformed by Postpartum Depression: Women’s Stories of Trauma and Growth*
- Book signing by Jennifer Moyer: *A Mother’s Climb Out of Darkness*
- Poster presentations
- Table demonstrations of UNC support services for maternal mental health
- Live music, food, and free chair massages

From 3p-4:30pm: Join us in the Women’s Hospital Conference Room 4 for a lecture:
“Perinatal Mental Health Disorders: How Far Have We Come?” Presented by perinatal psychiatry expert Emma Robertson Blackmore, PhD, with a discussion to follow.

From 7pm-9:30pm: Join us for a screening of *Dark Side of the Full Moon* at the Varsity Theater on Franklin Street. After the showing there will be a Q&A session with the filmmakers Maureen Fura & Jennifer Silliman. A $5 donation is appreciated.
THE MOST SHOCKING DOCUMENTARY ABOUT AMERICAN MOTHERHOOD THAT YOU’LL EVER SEE.

DARK SIDE OF THE FULL MOON

“CHILLING AND BRILLIANT.” — CHOICE! FILM FESTIVAL

#STANDWITHMOMS

FURA FILMS PRESENTS “DARK SIDE OF THE FULL MOON” 
WRITTEN BY MAUREEN FURA PRODUCED BY JENNIFER SILLIMAN, CAMILLE GOLDBERG AND RACHAEL WAX TABER EXECUTIVE PRODUCER RYAN FURA AND SHOSHANA BENNETT PRODUCER JONATHAN ZALBEN DIRECTED BY RACHAEL WAX TABER

WWW.DARKSIDEOFTHEFULLMOON.COM

DARK SIDE OF THE FULL MOON
Thanks!

- **UNC Psychiatry**
  - David Rubinow
  - Mary Kimmel
  - Christena Raines
  - Perinatal Psych Team of Clinicians and Nurses
  - Patrick Sullivan
  - Brenda Pearson and Katie Melvin

- **UNC OB-GYN**
  - Kate Menard
  - Bob Strauss
  - Alison Stuebe
  - Nancy Chesheir
UNC Center for Women’s Mood Disorders: Perinatal Psychiatry Program

Clinical and Research Program that provides assessment, treatment and support for women in the perinatal period

Collaboration of doctors, nurses, midwives, therapists, & social workers

www.womensmooddisorders.org