Maternal Mental Health Matters for Two Generations: Impact of Perinatal Mood and Anxiety Disorders on Fetal and Child Development

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Columbia University Vagelos College of Physicians & Surgeons
Research Scientist VI, New York State Psychiatric Institute
Speaker:

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Columbia University Vagelos College of Physicians & Surgeons
Research Scientist VI, New York State Psychiatric Institute
Disclosures

Grant with Curio, start up app company

Sit on the board of Zero to Three

NIH funding
OVERVIEW

I. DOHaD & adaptation
II. DOHaD & maternal mental health
III. Mechanisms of transmission
IV. Inter-Generational & health disparities lenses: An \textit{In-Utero} frame is too narrow
V. Pandemic Effects?
VI. Implications for the perinatal care ecosystem
I. DOHaD

Developmental Origins of Health and Disease

Aka, Prenatal Programming
How the first nine months shape the rest of your life

The oceans—why 70% of our planet is in danger

The Facebook Movie: The secret history of social networking

BY ANNIE MURPHY PAUL
Don’t blame the mothers

Careless discussion of epigenetic research on how early life affects health across generations could harm women, warn Sarah S. Richardson and colleagues.
• Most women and children are unaffected (fathers/partner have influence too)

• These maternal experience factors are a few of thousands of points of variability and not randomly distributed (look to society for change)

• The level of exposure is typically high*

• Effects are modifiable throughout development
How the first nine months shape the rest of your life

The new science of fetal origins

BY ANNIE MURPHY PAUL
The fetal origins of adult disease

D. J. P. BARKER

MRC Environmental Epidemiology Unit, University of Southampton, Southampton General Hospital, Southampton, SO16 6YD, U.K.

SUMMARY

Recent findings suggest that many human fetuses have to adapt to a limited supply of nutrients and in doing so they permanently change their physiology and metabolism. These ‘programmed’ changes may be the origins of a number of diseases in later life, including coronary heart disease and the related disorders: stroke, diabetes and hypertension.

Proceedings of the Royal Society
(1995)
Prenatal Programming

- Evolutionary perspective (Glover, 2011, Pike, 2005)
- Prenatal exposures ‘forecast’ the postnatal environment
- Fetus responds with adaptations
  - Improve fitness to a later stage in development
- Health outcomes may result, in part, from the match between the prenatal and postnatal environments
Maternal Prenatal Experience & Adaptations in Development

Density Triggers Maternal Hormones That Increase Adaptive Offspring Growth in a Wild Mammal

Ben Dantzer,1,† Amy E. M. Newman,2 Rudy Boonstra,3 Rupert Palme,4 Stan Boutin,5 Murray M. Humphries,6 Andrew G. McAdam1,2

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Density Triggers Maternal Hormones That Increase Adaptive Offspring Growth in a Wild Mammal

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Mediated “communicated” to fetus via cortisol?
When the brain is developing...
Dutch Famine Increases Risk for Schizophrenia Spectrum Disorders in Men

Depression, anxiety
II. DOHaD & Maternal Mental Health
The persisting effect of maternal mood in pregnancy on childhood psychopathology

KIERAN J. O’DONNELL, IVY VETTE GLOVER, EDWARD D. BARKER, and THOMAS G. O’CONNOR

McGill University; Imperial College London; Birkbeck University; University of Rochester Medical Center

Abstract

Developmental or fetal programming has emerged as a major model for understanding the early and persisting effects of prenatal exposures on the health and development of the child and adult. We leverage the power of a 46-year prospective study to examine the persisting effects of maternal anxiety, a key candidate in the developmental programming models, on symptoms of behavioral and emotional problems across five occasions from age 4 to 15 years. The study is based on the Avon Longitudinal Study of Parents and Children cohort, a prospective, longitudinal study of a geographically defined sample in the west of England (n = 13,444). Potential confounders included psychosocial and obstetric risk, maternal mental health, perinatal and postnatal mood, and parenting. Results indicate that maternal prenatal anxiety contributed uniquely to higher behavioral and emotional symptom levels across childhood with no diminishment of effect with adulthood. Perinatal anxiety in 1980 was associated with at least five years of a probable child mental disorder, 30% compared with 8% after adjusting for confounders. Results were similar with maternal depression. These analyses provide some of the strongest evidence to date that prenatal maternal mood has a direct and persisting effect on her child’s psychiatric symptoms and support in utero programming hypotheses.

Developmental or adaptive programming, including in the fetal period, has emerged as a major model for understanding the developmental origins of health outcomes. The model proposes that in utero exposures instigate an adaptive response in the organ systems that is carried forward in development with persisting effects on behaviour and biology. Much of this work focuses on poor nutrition or an index of poor growth (e.g., low birth weight) as the causal factor, although other and additional sources of stress with causal effects may be operating (Barker, 1999; Gluckman & Hanson, 2005; Painter, Roozenbroek, & Hillemeier, 2005; Wadhwa, Bros, Ertinger, & Swanson, 2009). Evidence for the model as applied to cardiovascular and metabolic outcomes is substantial, derived from numerous large-scale investigations in diverse settings, and has spawned an influential line of study because of its potential to influence health and development of populations in developed and developing countries (Cullen et al., 2005).

We are extremely grateful to all of the families who have participated in this study, the midwives for their help in recruiting them, and the whole Avon Longitudinal Study of Parents and Children team, which includes interviewers, computer and laboratory technicians, clinical workers, research scientists, volunteers, managers, secretaries, and nurses. The UK Medical Research Council, the Wellcome Trust, and the University of Bristol continue to provide core support for the Avon Longitudinal Study of Parents and Children. This particular project was funded in part by NIH (Grant ROI 5033005) and the Smithson Foundation.

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Building on the fetal programming model for somatic health, several research groups are seeking to translate the model for psychological and neuroscience outcomes. These studies focus on maternal prenatal anxiety or stress as a putative causal agent initiating a developmental programming response. The focus on prenatal anxiety or stress follows from decades of experimental animal studies linking prenatal stress to sickness and lasting effects on offspring’s fear, neurogenesis, immunity, and stress physiology, among other outcomes (Ce et al., 2005; Maccari et al., 2008). A number of observational studies in human show that prenatal anxiety or stress in the mother is associated with behavioral outcomes in children (Bergman, Sartor, O’Connor, Modi, & Glover, 2007; Butze, Blizinik, Milde, de Medina, & Visser, 2001; Desa, Glyn, Wulfam, & Sandman, 2001; O’Connor, Hen, Golding, & Glover, 2003; Robinson et al., 2013; van den Bergh et al., 2006). These results raise important conceptual challenges for studies of developmental models of psychopathology that, with a few exceptions (Fischer et al., 2013; Liu, Pern-ny, & Rinn, 2012), tend to consider neither prenatal exposures nor programming effects. Furthermore, the hypothesis that there are prenatal programming effects for psychopathology has sizable implications for intervention, and particularly the timing of early interventions. Interventions starting in early infancy to promote the mother-infant relationship and the quality of parenting (Allen, 2011; Meltzoff, Bekesy, Leyland, & Barnes, 2008) are grounded in research linking the quality of the early postnatal mothering environment and the behavioral, emotional, and cognitive development of the child (Mcmyn et al., 2011; Nelson et al., 2007; Rancamani

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Rates of ADHD, Anxiety N=7,944

Figure 3. The predicted population prevalence of a probable mental health disorder in children born to high (open bars represent the top 15%) and low (filled bars) anxiety mothers. Estimates are based on total Strengths and Difficulties Questionnaire scores generated using growth curve analysis controlling for birth weight, gestational age, substance use in pregnancy, maternal age, education, crowding as index of socioeconomic status, parenting style (see Methods), maternal depression at 8 weeks postnatal, maternal postnatal anxiety at 33 months, paternal prenatal anxiety, paternal postnatal depression at 8 weeks, and paternal postnatal anxiety at 33 months.
NEW RESEARCH

Associations of Maternal Prenatal Stress and Depressive Symptoms With Childhood Neurobehavioral Outcomes in the ECHO Cohort of the NICHD Fetal Growth Studies: Fetal Growth Velocity as a Potential Mediator

Vanessa Babineau, PhD, Yaneve N. Fonge, MD, Emily S. Miller, MD, MPH, William A. Grobman, MD, MBA, Pamela L. Ferguson, PhD, Kelly J. Hunt, PhD, John E. Vena, PhD, Roger B. Newman, MD, Constance Guille, MD, MSCR, Alan T.N. Tita, MD, PhD, Paula C. Chandler-Laney, PhD, Seonjoo Lee, PhD, Tianshu Feng, MS, Pamela Scorza, ScD, MPH, Lea Takács, PhD, Ronald J. Wapner, MD, Kristy T. Palomares, MD, PhD, Daniel W. Skupski, MD, Michael P. Nageotte, MD, Anthony C. Sciscione, DO, Stephen Gilman, ScD, Catherine Monk, PhD
# Maternal Depression and Stress Are Associated with Children’s Neurodevelopmental Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Prenatal Stress</th>
<th>Prenatal Stress ≥85&lt;sup&gt;th&lt;/sup&gt; (n=108)</th>
<th>Prenatal Depression</th>
<th>Prenatal Depression ≥10 (n=50)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive functions</td>
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<td>ns</td>
<td>ns</td>
<td>- Cognitive flexibility deficits</td>
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<td>- Inhibitory control/sustained</td>
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<td>attention deficits in males†</td>
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<td>Motor skills</td>
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<td>- Strength deficits</td>
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<td>- Strength deficits in males†</td>
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<td>Psychiatric problems</td>
<td>- Attention problems</td>
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<td></td>
<td>- Oppositional defiant†</td>
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<td>- Conduct problems</td>
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<td>- Depression</td>
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<td></td>
<td>- Depression</td>
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</table>

**Notes:** Models adjusted with covariates: maternal age, pre-gravid body mass index, education background, income adjusted for household family size, prenatal social support, maternal stress and depressive symptoms at time of child neurobehavioral assessment, fetal exposure to secondhand smoke, biological sex, maternal self-reported race/ethnicity, mode of delivery, and gestational age at birth.

†Remained significant after multiple comparison correction
Maternal Depression and Stress Are Associated with Children’s Neurodevelopmental Outcomes: Sexually Dimorphic Findings

**Note**: Maternal prenatal depressive symptoms measured on EPDS.  
* \( p < 0.05 \) \( \)  
* * \( p < 0.01 \) \( \)
Maternal Prenatal Distress

Prenatal distress predicts Postnatal environment

Child Risk for Psychopathology
How to ask the fetus questions…
“the patient was told that she was breathing a gas which contained only half the amount of oxygen necessary to support fetal life, but that her normal body mechanisms would probably compensate for this altered environmental condition” (Copher & Huber, 1967)
Maternal heart rate

Fetal heart rate

Fetus registers mother’s *acute* emotional experience

Implication: fetus may be shaped over gestation based on exposure to *chronic* maternal affect dysregulation

3rd trimester fetus

*Fig. 3.* The effect of induced maternal anxiety with concomitant gaseous stimulation of the maternal and fetal heart rates.
IRB Sanctioned Approach to Eliciting Stress in the Lab

• Elicit maternal stress in the laboratory
• Observe transmission to the fetus via fetus registering experience and showing a change in fetal heart rate
• Stressor
• Stroop color word matching task
• NADA
Fetal Heart Rate Reactivity Differs by Women’s Psychiatric Status: An Early Marker for Developmental Risk?

No baseline differences in fetal heart rate

No differences in maternal responses to lab stressor

As if a door suddenly opens…

3rd trimester fetuses
ORIGINAL ARTICLE

Alterations in amygdala–prefrontal circuits in infants exposed to prenatal maternal depression

J Posner¹,²,³, J Cha¹,²,³, AK Roy³, BS Peterson⁴, R Bansal⁴, HC Gustafsson¹, E Raffanello², J Gingrich¹,² and C Monk¹,²
fMRI Results: Newborns Exposed to Untreated Maternal Depression versus No Depression Have Less Connectivity between the Prefrontal Cortex and the Amygdala – a More Reactive Brain
Fetal Heart Rate Reactivity is Associated with Infants’ Brain Connectivity
Fetal Heart Rate Reactivity is Associated with Infant Behavior
Prenatal Predictors of Infant Temperament

ABSTRACT: Emerging data suggest that prenatal factors influence children’s temperament. In 50 dyads, we examined fetal heart rate (FHR) activity and women’s antenatal psychiatric illness as predictors of infant temperament at 4 months (response to novelty and the Infant Behavior Checklist). FHR change during maternal challenge was positively associated with observed infant motor reactivity to novelty (p = .02). The odds of being classified as high versus low motor among fetuses who had an increase in FHR during maternal stress was 11 times those who had a decrease in FHR (p = .0006). Antenatal psychiatric diagnosis was
Early Childhood Predictors of Adult Anxiety Disorders

Jerome Kagan and Nancy Snidman

From Harvard University, Cambridge, Massachusetts.
Address reprint requests to: Jerome Kagan, Department of Psychology, Harvard University, 33 Kirkland Street, Cambridge, MA 02138.
Received February 5, 1999; revised May 3, 1999; accepted May 4, 1999.

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REPORTS

Inhibited and Uninhibited Infants “Grown Up”: Adult Amygdalar Response to Novelty

Carl E. Schwartz, 1,2,3, Christopher I. Wright, 2,3,4 Lisa M. Shin, 2,5
Jerome Kagan, 6 Scott L. Rauch 2,3

20 June 2003  VOL 300  SCIENCE  www.sciencemag.org
Neonatal Brain Response to Deviant Auditory Stimuli and Relation to Maternal Trait Anxiety

Chad M. Sylvester, M.D., Ph.D., Michael J. Myers, B.A., Michael T. Perino, Ph.D., Sydney Kaplan, B.S., Jeanette K. Kenley, B.S., Tara A. Smyser, M.S., Barbara B. Warner, M.D., Deanna M. Barch, Ph.D., Daniel S. Pine, M.D., Joan L. Luby, M.D., Cynthia E. Rogers, M.D., Christopher D. Smyser, M.D.

*AJP*, August ‘21
Results: Neonates manifested a robust and widespread neural response to deviant stimuli that resembles patterns found previously in adults. Higher maternal trait anxiety was related to higher responses within multiple brain regions, including the left and right anterior insula, the ventrolateral prefrontal cortex, and multiple areas within the anterior cingulate cortex. These areas overlap with brain regions previously linked to anxiety disorders and other psychiatric illnesses in adults.

Conclusions: The neural architecture sensitive to deviant stimuli robustly functions in newborns. Excessive responsiveness of some circuitry components at birth may signal risk for anxiety and other psychiatric disorders.
Maternal Mental Health & Prenatal Programming

- Prenatal maternal distress associated with greater reactivity to environment
- Evolutionary perspective
- Prenatal distress exposure ‘forecasts’ an adverse (dangerous) environment
- Heightened reactivity
- Adaptive: prepared for (challenging) postnatal environment to come
- Consequences for the child:
  - Match or mismatch with environment
  - ADHD, anxiety
III. Mechanisms
Annual Review of Clinical Psychology
Prenatal Developmental Origins of Future Psychopathology: Mechanisms and Pathways

Catherine Monk,1,2,3 Claudia Lugo-Candelas,1,3 and Caroline Trumpp1,3

1Department of Psychiatry, Columbia University, New York, NY 10032, USA; email: cmonk1@cumc.columbia.edu
2Department of Obstetrics and Gynecology, Columbia University, New York, NY 10032, USA
3New York State Psychiatric Institute, New York, NY 10032, USA; email: Claudia.Lugo@nypg.columbia.edu, Caroline.Trumpp@nypg.columbia.edu

Keywords
prenatal stress, DOHaD, brain development, depression, placenta

Abstract
The developmental origins of health and disease hypothesis applied to neurodevelopmental outcomes asserts that the fetal origins of future development are relevant to mental health. There is a third pathway for the familial inheritance of risk for psychiatric illness beyond shared genes and the quality of parental care: the impact of pregnant women’s distress—defined broadly to include perceived stress, life events, depression, and anxiety—on fetal and infant brain–behavior development. We discuss epidemiological and observational clinical data demonstrating that maternal distress is associated with children’s increased risk for psychopathology. For example, high maternal anxiety is associated with a twofold increase in the risk of probable mental disorder in children. We review several biological systems hypothesized to be mechanisms by which maternal distress affects fetal and child brain and behavior development, as well as the clinical implications of studies of the developmental origins of health and disease that focus on maternal distress. Development and parenting begin before birth.
Cortisol/HPA Axis

Major effector of stress response system

Prenatal cortisol exposure influences development

• Hyperactivity in the amygdala
• Neuronal migration, neurotransmitter activity, synaptic plasticity
• Alters set point of stress hormone regulation
• Heightened anxiety behaviors in the offspring (Seckl & Holmes, 2007)
Cortisol during Pregnancy

- Placenta enzyme 11BHSD2 inactivates cortisol to cortisone

Sandman et al. (2011) *International journal of peptides & ObGYNKey*
Maternal Anxiety Moderates the Association between Maternal Plasma & Amniotic Fluid Cortisol

Glover, V. et al., 2009, Psychoneuroendocrinology
Distress During Pregnancy: Epigenetic Regulation of Placenta Glucocorticoid-Related Genes and Fetal Neurobehavior

Catherine Monk, Ph.D., Tianshu Feng, M.S., Seonjoo Lee, Ph.D., Izabela Krupska, M.A., Frances A. Champagne, Ph.D., Benjamin Tycko, M.D., Ph.D.

Am J Psychiatry 00:0, 2016

Frances Champagne & Ben Tycko
Maternal Prenatal Stress is Associated with Greater Placenta HSD11B2 Gene Methylation
Greater HSD11B2 Gene Methylation is Associated with Less Fetal Coupling

Fetal coupling: CNS development, integration of ANS + somatic systems; associated with more rapid brainstem auditory evoked responses at birth.
IV. Inter-Generational & Health Disparities Lenses: An In-Utero Frame is Too Narrow
Inter-Generational Transmission of Risk – Gestational Biology Transmission

Buss et al. (2017)
Pregnant women with bipolar disorder who have a history of childhood maltreatment: Intergenerational effects of trauma on fetal neurodevelopment and birth outcomes

Vanessa Babineau1 | Clare A. McCormack2 | Tianshu Feng3 | Seonjoo Lee4,5 | Obianuju Berry6 | Bettina T. Knight7 | Jeffrey D. Newport8 | Zachary N. Stowe9 | Catherine Monk10

Vanessa Babineau, Zach Stowe, Jeff Newport
Methods

• Diagnosed Bipolar Disorder, ages 18-45
  2% prevalence rate
• Psychiatric care; psychopharm and support
• Mood depression, anxiety, mania clinician and patient ratings
  x3 pregnancy
Medications

- SRI Only: 6%
- SRI + Other: 36%
- Other Only: 47%
- None: 11%

Detailed breakdown of Other Only:
- Bupropion only: 3%
- Lamotrigine only: 23%
- Other (2 or more): 48%
- Atypical only: 23%
- Cardio only: 5%
Responders & Non-Responders By Mood (no differences on medications)
### Responders & Non-Responders
#### Well-Resourced Sample

<table>
<thead>
<tr>
<th></th>
<th>Total Sample (n=82)</th>
<th>Responders (n=67)</th>
<th>Non-Responders (n=15)</th>
<th>Group Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean (SD) or %</td>
<td>n</td>
<td>Mean (SD) or %</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>66</td>
<td>80.5%</td>
<td>58</td>
<td>86.6%</td>
</tr>
<tr>
<td>Black</td>
<td>8</td>
<td>9.8%</td>
<td>5</td>
<td>7.5%</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>9.8%</td>
<td>4</td>
<td>6%</td>
</tr>
<tr>
<td><strong>Ethnicity Hispanic</strong></td>
<td>2</td>
<td>2.4%</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Mother's age</strong></td>
<td>86</td>
<td>32.4 (4.6)</td>
<td>67</td>
<td>32.6 (4.6)</td>
</tr>
<tr>
<td><strong>Mother's years of education</strong></td>
<td>86</td>
<td>15.4 (2.2)</td>
<td>67</td>
<td>15.7 (2.2)</td>
</tr>
<tr>
<td><strong>Marital Status -- Married</strong></td>
<td>60</td>
<td>73.2%</td>
<td>51</td>
<td>76.1%</td>
</tr>
<tr>
<td><strong>Gravidity</strong></td>
<td>86</td>
<td>2.7 (1.7)</td>
<td>67</td>
<td>2.5 (1.5)</td>
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<tr>
<td><strong>Parity</strong></td>
<td>86</td>
<td>0.8 (1.2)</td>
<td>67</td>
<td>0.8 (1.1)</td>
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<tr>
<td><strong>Hollingshead</strong></td>
<td>86</td>
<td>45.1 (11.8)</td>
<td>67</td>
<td>46.2 (10.6)</td>
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<tr>
<td><strong>Baby Sex Male</strong></td>
<td>45</td>
<td>55.6%</td>
<td>37</td>
<td>56.1%</td>
</tr>
<tr>
<td><strong>Planned Pregnancy Yes</strong></td>
<td>54</td>
<td>67%</td>
<td>48</td>
<td>73%</td>
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<tr>
<td><strong>Desired Pregnancy</strong></td>
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<tr>
<td>No</td>
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<td>2.5%</td>
<td>1</td>
<td>1.5%</td>
</tr>
<tr>
<td>Yes</td>
<td>60</td>
<td>75%</td>
<td>54</td>
<td>83.1%</td>
</tr>
<tr>
<td>Ambivalent</td>
<td>18</td>
<td>22.5%</td>
<td>10</td>
<td>15.4%</td>
</tr>
</tbody>
</table>
Fetuses of Non-Responder Women are Born Earlier

Red: Depressed, Non Responder
Black: Euthymic, Responder
Responders & Non-Responders Differ by Maternal Childhood Maltreatment

<table>
<thead>
<tr>
<th></th>
<th>Total Sample (n=82)</th>
<th>Responders (n=67)</th>
<th>Non-Responders (n=15)</th>
<th>Group Differences</th>
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<td></td>
<td>n Mean (SD) or %</td>
<td>n Mean (SD) or %</td>
<td>n Mean (SD) or %</td>
<td>p-value</td>
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<tr>
<td>CTQ Physical Abuse</td>
<td>86 7.2 (3.4)</td>
<td>67 6.8 (2.9)</td>
<td>15 9.3 (4.7)</td>
<td>0.006</td>
</tr>
<tr>
<td>CTQ Physical Neglect</td>
<td>86 7.1 (3.1)</td>
<td>67 6.6 (2.5)</td>
<td>15 8.6 (4.2)</td>
<td>0.003</td>
</tr>
<tr>
<td>CTQ Sexual Abuse</td>
<td>86 7.0 (4.2)</td>
<td>67 6.3 (3)</td>
<td>15 9.5 (6.5)</td>
<td>0.015</td>
</tr>
<tr>
<td>CTQ Emotional Abuse</td>
<td>86 10.7 (4.8)</td>
<td>67 10.1 (4.8)</td>
<td>15 13.3 (4)</td>
<td>0.009</td>
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<td>CTQ Emotional Neglect</td>
<td>86 10.8 (5.0)</td>
<td>67 10.2 (4.7)</td>
<td>15 13 (5.3)</td>
<td>0.066</td>
</tr>
<tr>
<td>CTQ Denial</td>
<td>86 0.4 (0.8)</td>
<td>67 0.4 (0.9)</td>
<td>15 0.1 (0.4)</td>
<td>0.3</td>
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<tr>
<td>Total CTQ score</td>
<td>86 42.9 (15.0)</td>
<td>67 40 (13.8)</td>
<td>15 53.7 (16.3)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Childhood Maltreatment</td>
<td>41 50%</td>
<td>28 41.8%</td>
<td>13 86.7%</td>
<td>0.003</td>
</tr>
</tbody>
</table>

CTQ total score range 5-125, each question rated 1-5.
Maternal Childhood Maltreatment Affects Next Generation via Maternal Depression (non responders)
Differential responses to psychotherapy versus pharmacotherapy in patients with chronic forms of major depression and childhood trauma

Maternal prenatal stress phenotypes associate with fetal neurodevelopment and birth outcomes

Kate Walsh\textsuperscript{a,b}, Clare A. McCormack\textsuperscript{c}, Rachel Webster\textsuperscript{d}, Anita Pinto\textsuperscript{e}, Seonjoo Lee\textsuperscript{f,g}, Tianshu Feng\textsuperscript{g}, H. Sloan Krakovsky\textsuperscript{d}, Sinclaire M. O’Grady\textsuperscript{d}, Benjamin Tycko\textsuperscript{h}, Frances A. Champagne\textsuperscript{i,j}, Elizabeth A. Werner\textsuperscript{d,i}, Grace Liu\textsuperscript{i}, and Catherine Monk\textsuperscript{d,f,i,t}

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Edited by Bruce S. McEwen, Rockefeller University, New York, NY, and approved September 18, 2019 (received for review April 16, 2019)
LPA: Three Different Stress Groups in a Sample of Healthy Pregnant Women

- 67% healthy
- 17% psychologically stressed
- 16% physically stressed
Health Disparities: Social Demographics & Childhood Maltreatment

• Compared to the healthy group:
  • psychologically stressed group had
    • Higher % Latinas
    • Lower education
    • Lower income
    • Higher % health insurance covered by Medicaid
    • Greater use of WIC
    • Higher % of prior pregnancies and adverse outcomes

• Psychologically and physically stressed groups had
  • Higher rates of childhood trauma (abuse & neglect)
Baby Outcomes Prematurity (<= to 37 weeks) by Stress Groups
Maternal Childhood Maltreatment & Prenatal Programming

- Earlier birth in stress groups with higher rates of maternal childhood trauma

- Pregnancy outcomes responsive to environmental cues related to woman’s life and childhood

- Evolutionary perspective, less time in a non-optimal environment

- Yet earlier birth is a significant risk factor for ADHD and other neurodevelopmental problems
Many Factors Shape Maternal Mental Health and a Child’s Life before Birth

- Maternal childhood trauma
- Maternal untreated depression, anxiety
- Race/ethnicity
  Including systemic racism in medical care

BRIEF: MATERNAL AND CHILD HEALTH INEQUITIES EMERGE BEFORE BIRTH
https://stateofbabies.org/MaternalandChildHealthInequitiesBrief
This companion brief to the State of Babies Yearbook: 2020 addresses serious inequities in maternal health and birth outcomes, when health data are disaggregated and examined by race and ethnicity.
V. Possible Pandemic Effects
Birth during the COVID-19 Pandemic, but not Maternal SARS-CoV-2 Infection in Pregnancy, is Associated with Lower Neurodevelopmental Scores at 6-Months
Association of Birth During the COVID-19 Pandemic With Neurodevelopmental Status at 6 Months in Infants With and Without In Utero Exposure to Maternal SARS-CoV-2 Infection

Lauren C. Shuffrey, PhD; Morgan R. Firestein, PhD; Margaret H. Kyle, BA; Andrea Fields, MA; Carmela Alcántara, PhD; Dima Amso, PhD; Judy Austin, PhD; Jennifer M. Bain, MD, PhD; Jennifer Barbosa, MA; Mary Bence, BA; Catherine Bianco, BA; Cristina R. Fernández, MD, MPH; Sylvie Goldman, PhD; Cynthia Gyamfi-Bannerman, MD, MS; Violet Hott, BA; Yunzhe Hu, BA; Maha Hussain, MS; Pam Factor-Litvak, PhD; Maristella Lucchini, PhD; Arthur Mandel, MD, PhD; Rachel Marsh, PhD; Danielle McBrian, MD; Mirella Mourad, MD; Rebecca Muhle, MD, PhD; Kimberly G. Noble, MD, PhD; Anna A. Penn, MD, PhD; Cynthia Rodriguez, BA; Ayesha Sania, ScD; Wendy G. Silver, MD, MA; Kally C. O’Reilly, PhD; Melissa Stockwell, MD; Nim Tottenham, PhD; Martha G. Welch, MD; Noelia Zork, MD; William P. Fifer, PhD; Catherine Monk, PhD; Dani Dumitriu, MD, PhD
No Effect of SARS-CoV2, Effects of Perinatal Period during the Pandemic

*Maternal report
Pandemic Effects during 1st Trimester?
When the brain is developing...

Sestan & State, 2018
Pandemic Effects

- Maternal report versus observer based assessment
- Stress during pregnancy?
- Aspects of postnatal environment?
- Likely can be modified
VI. Implications for Prenatal Care Ecosystem
# Women’s Mental Health @Ob/Gyn

## Faculty

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Cara Aloisio</td>
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<td>Ashlie Butler</td>
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<td>Laura Sinkman</td>
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<tr>
<td>Elizabeth Werner</td>
<td>PHD</td>
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Social Support

VIP Analysis

Target social support in day to day interactions and interventions
Transforming Perinatal Care Ecosystem

• Planning for daily life
  • Doula
  • Family support (or no?)
  • Sleep
  • Physical activity
  • Time to decompress

• Managing expectations
  • Loss
  • Identity shifts
  • Marital relationship decline
  • Expecting the unexpected
  • Time not one’s own

• Intentional reflection on parent want to be
  • How parented affects how you parent

• Co-located mental health care
  • Accessible, affordable
Last Thoughts & Future Directions

• A life course perspective is essential for researching and treating maternal mental health conditions

• A woman’s mental health during pregnancy and the postpartum period reflect the life she is living and has lived and the social-economic context of her life

• When we treat women’s mental health issues and overall well-being, we also are helping the next generation
“I like to think that each generation will need a little less therapy than the generation before.”
1st MMH Intensive Training

• Monday, May 16, 2022 • 4:00pm - 7:00pm
  • Epidemiology of Perinatal Mood and Anxiety Disorders (PMADs) & Psychiatric Assessment and Diagnosis
  • Screening for PMADs and Assessing Suicide Risk
  • Non-pharmacologic and Antidepressant Treatments for PMADs (pregnancy and lactation)
  • Interactive Case Vignettes

Intensive Training includes three, 1-hour follow-up sessions, held on Mondays from 12 pm – 1 pm.

• Unipolar depression: Special dosing considerations during the perinatal period and what to do with antidepressant partial/non-response.
• Advanced Suicide Risk Assessment and Management in Obstetric and Family Medicine Practices
• Role of OBGYNs and PCPs in the assessment and management of bipolar disorder during the perinatal period
Webinars

- Webinars will be offered live and recorded for posting on the website.

**Planned webinar topics**

- Substance use disorders during the perinatal period
- Perinatal anxiety disorders
- Treatment of ADHD in perinatal patients
- Understanding sleep and treatment of insomnia in perinatal patients
- Transition to parenthood: Transforming obstetrical care to enhance family health
- Intimate partner violence and mental health in the perinatal period
Stay in touch with us, access resources and register for no-cost CME

Website - www.ProjectTEACHny.org

Families Thrive With Good Mental Health
Supporting maternal health and pediatric clinicians to deliver quality mental health care in New York State.
Thank you!