Enhancing methodological rigor in studies of complementary health approaches for perinatal mental health: Biobehavioral research study design considerations

[in Symposium: Complementary Approaches for Perinatal Mental Health]

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Objectives

• Discuss the need for rigorous biobehavioral research regarding complementary health approaches for perinatal mental health
• Appreciate recent research findings related to the feasibility, acceptability, and preliminary effects of prenatal yoga with diverse pregnant women
• Describe implications of research findings for the design and development of future studies regarding complementary health approaches for perinatal stress and depression
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*Centering Pregnancy Care plus Yoga for Diverse Pregnant Women*

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*Biomarkers in a Study of Centering Pregnancy Care plus Yoga for Diverse Pregnant Women*

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National Institute on Minority Health and Health Disparities (NIMHD)
*Sub-study: Racial Differences in Epigenetic Mechanisms of Preterm Birth*

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*Epigenetic, social, and environmental mechanisms underlying postpartum depression*

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National Center for Advancing Translational Sciences (UL1TR000058); Virginia Commonwealth University
*Social, environmental, and epigenetic mechanisms underlying postpartum depression: A pilot study*
Background: Biobehavioral Research

• Goals
  – Understanding associations, mechanisms, pathways
  – Developing, targeting, and evaluating interventions
Background: Methodological rigor

• Major critique of research on complementary health approaches is centered around lack of methodological rigor

  – For example:
    • lack of adequate control
    • lack of conceptual framework
    • lack of objective outcome measures
Why the “bio” in biobehavioral?

• Health: interaction of biological, social, behavioral, environmental factors

• Stress and biomarkers
  – HPA axis (e.g., CRH, ACTH, cortisol)
  – Autonomic nervous system (e.g., epinephrine, norepinephrine, dopamine, salivary α-amylase)
  – Immune function (cytokines, c-reactive protein)

Non-invasive stress biomarkers

- **sAA**
  - an indicator of ANS dysregulation
  - sensitive to intervention

- **sNGF**
  - neurotrophic aspect of stress-response system
  - relates to both ANS and HPAA changes
Example: Current Study using Non-Invasive Stress Biomarkers

Integration of Yoga into Group Prenatal Care: Centering Pregnancy Care + Yoga [CPC+Y] (STTI; PI: Kinser)

• Aim 1: evaluate feasibility & acceptability of CPC+Y
• Aim 2: explore preliminary effects on psychological outcomes compared to those who participate in CPC alone
• Aim 3: explore preliminary effects of CPC+Y on maternal biological outcomes (weight, blood pressure, non-invasive stress biomarkers: salivary α-amylase, salivary NGF)
CPC+Y for overweight/obese diverse women

- Social support and targeted goal-setting for weight management
- Gentle PA (yoga) in controlled, safe environment
- Encouragement to address home environmental factors re: weight management

Individual
- SES & health history
- Mood (PHQ9, PSS, STAI, RRS)
- PA Self-Efficacy (PASES)
- Experiences with CPC+Y
- Wt; blood pressure; salivary alpha-amylase, salivary nerve growth factor

Environment
- Group environment & social support to engage in PA

Behavior
- Engage in activity (retention in CPC+Y; PPAQ; FFQ)

Long-term Outcomes
(to be measured in future studies)
- Pregnancy outcomes
- Weight management
- Infant and child health
- Sustainability of maternal PA

Figure 1. Application of Social Cognitive Theory to CPC+Y Activities and Outcomes Measured in Pilot Study
Figure 2. Highly simplified schema of mediators and moderators potentially related to cell damage or dysfunction, accelerated cellular aging, and chronic stress.

**Chronic Stress**

HPAA dysfunction & neurobiological alterations

**Potentially protective mediators**
- Counterregulatory neurosteroids (DHEA, allopregnanolone)
- Inhibitory neurotransmitters (GABA)
- Insulin sensitivity
- Antioxidants (Vit C, E)
- Neurotrophic factors (BDNF, NGF)
- Anti-inflammatory/immunoregulatory cytokines (IL10)

**Potentially damaging mediators**
- Hyper/hypocortisolemia (& ↓ glucocorticoid receptors)
- Synaptic glutamate
- Intracytoplasmic calcium
- Free radicals
- Pro-inflammatory cytokines (IL6, TNF-α)

**Immune dysregulation**

**Inflammation & oxidative stress**

**Accelerated cellular aging**

Potential moderators:
- Genetic & epigenetic factors
- Cognitive appraisal
- Social support
- Coping styles, etc.


Why yoga?

• Gentle introduction to PA and mindfulness
• Yoga has been shown to assist with depression symptom management
• My research suggests women are interested in yoga for self-management
• Mindfulness-based strategies, such as yoga, appear to enact change via biobehavioral mechanisms
More “bio” in biobehavioral

• Epigenetic measures
  • “epi” = on, upon, or over
  • “genetics” = DNA sequence

processes and mechanisms that affect activity of DNA but do not change the DNA itself
**EPIGENETIC MECHANISMS** are affected by these factors and processes:
- Development (in utero, childhood)
- Environmental chemicals
- Drugs/Pharmaceuticals
- Aging
- Diet

**HEALTH ENDPOINTS**
- Cancer
- Autoimmune disease
- Mental disorders
- Diabetes

**DNA methylation**
Methyl group (an epigenetic factor found in some dietary sources) can tag DNA and activate or repress genes.

**Histone modification**
The binding of epigenetic factors to histone “tails” alters the extent to which DNA is wrapped around histones and the availability of genes in the DNA to be activated.

Histones are proteins around which DNA can wind for compaction and gene regulation.

![Image from http://commonfund.nih.gov/epigenomics/figure](http://commonfund.nih.gov/epigenomics/figure)
DNAm: the “dimmer switch”

Example: Current Epigentics Study

Social, environmental, and epigenetic mechanisms underlying perinatal depression (ANF; PI: Kinser; P60, PI: York)

- Goal: understand biobehavioral mechanisms of perinatal depression in diverse women
Example: new study combining Intervention & Epigenetic Research

*Self-management of chronic depressive symptoms in pregnancy* (NIH/NICHD; PI: Kinser)

Goal: evaluate psychobehavioral and epigenetic outcomes (DNAm) of a self-management intervention (involving motivational interviewing and mindful physical activity) for pregnant women with depressive symptoms
“MOMS”: Mindfulness of Movement and Symptoms
12-week SM intervention during pregnancy
- Awareness of symptoms and goals via nurse-participant partnership
- Mindfulness-based PA (group prenatal yoga classes)
- Self-guided home PA

Baseline Individual and Environmental Co-Factors
age; SES; history of depressive symptoms; traumatic experiences; social support

Pre-Intervention Status
depressive symptoms; stress; anxiety; ruminations; self-efficacy for PA; maternal-child attachment

epigenetic patterns (genome-wide and gene-specific DNAm)

engagement in and self-efficacy for PA

End of 12-week Intervention
Behavioral: recruitment, retention, adherence, and satisfaction with MOMS (Aim 1)
Psychosocial: self-efficacy for PA; depressive symptoms; stress; anxiety; ruminations; maternal-child attachment (Aim 2)
Biological: DNAm (Aim 3)

Postpartum
Behavioral: satisfaction with and continued use of MOMS (Aim 1)
Psychosocial: self-efficacy for PA; depressive symptoms; stress; anxiety; ruminations; maternal-child attachment (Aim 2)

Figure 3. Framework of factors involved in chronic depressive symptoms during pregnancy, aspects of MOMS intervention, and outcome measures [SES: socioeconomic status; PA: physical activity; DNAm: DNA methylation patterns; SM: self-management]
Questions?

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