A Translational Study of Mindfulness Based Cognitive Therapy (MBCT) for Pregnant Women

Alice Graham, PhD
Kristen Mackiewicz Seghete, PhD
Departments of Psychiatry & Behavioral Neuroscience

Psychiatry Grand Rounds
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No conflicts of interest
Big Picture Questions

1) Why should we do mental health interventions during pregnancy?

2) What is Mindfulness Based Cognitive Therapy (MBCT) for pregnant women?

3) *How* can MBCT improve maternal and infant outcomes, or in other words how may it hold promise as an *intergenerational* intervention?
Big Picture Questions

1) **Why should we do mental health interventions during pregnancy?**

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Postpartum Psychopathology

High prevalence rates:
  - Up to 20% depression
  - 8-12% anxiety disorder
  - Most common pregnancy complication

Identified some pre-pregnancy risk factors

Prevalence rates as high as 40% in at-risk women

Consequences for maternal health and maternal responsivity

AND

Infant behavioral/mental health and attachment

But, most maternal AND dyadic interventions are developed for the postpartum period...

Di Florio et al., 2013; Gavin et al., 2013; Goodman et al., 2009; Marcus et al., 2011; Pawluski et al., 2017
Why would we intervene during pregnancy?
Maternal Programming

Heightened neuroplasticity during pregnancy and postpartum

Neuroplasticity = increased ability to support neural changes, both functionally and structurally

Pregnancy and postpartum as a “sensitive period”

Maternal programming refers to the effect of endocrine and other reproductive, biological events on the structure and function of women’s brains during pregnancy and postpartum

Supports preparation of the mother to both promote healthy fetal development in utero and maternal responsivity and caregiving

For review, see Glynn et al., 2018; Kim et al., 2016
Maternal Programming

Pregnancy:

- Increased vigilance for threat
- Increased prefrontal activity for threat, but decreased prefrontal activity for detecting neutral cues
- Decreased prefrontal activity during inhibition

Postpartum:

- Increased activation of brain circuits responsible for detecting highly salient information

For review, see Glynn et al., 2018; Kim et al., 2016
Maternal Programming

Pregnancy:

- Increased vigilance for threat
- Increased prefrontal activity for threat, but decreased prefrontal activity for detecting neutral cues
- Decreased prefrontal activity during inhibition

Postpartum:

- Increased activation of brain circuits responsible for detecting highly salient information
- Increased activation and volume of brain circuits implicated in reward processing (ventral striatum)

For review, see Glynn et al., 2018; Kim et al., 2016
Postpartum Depression

Laurent & Ablow, 2012, *Figure 1.*
Intergenerational Transmission

Habas et al., 2010, Figure 1.
Developmental Programming

“Process by which the early environment interacts with genetic and other factors to produce an individual human constitution.” Entringer, 2007

Biological systems undergoing rapid developmental changes are especially vulnerable to organizing and disorganizing influences

Fetal Brain Development

Kinoshita et al., 2001; Lenroot & Geidd, 2006
Implications of Developmental Programming for Health and Disease

Schizophrenia After Prenatal Exposure to the Dutch Hunger Winter of 1944-1945

Epidemiologic Studies of Exposure to Prenatal Infection and Risk of Schizophrenia and Autism

Prenatal Psychosocial Stress Exposure Is Associated With Subsequent Working Memory Performance in Young Women

Prenatal stress, glucocorticoids and the programming of adult disease

Elizabeth C. Cottrell* and Jonathan R. Seckl

Frontiers in Behavioral Neuroscience

Risk for Psychiatric Disorders
Maternal Stress During Pregnancy and Intergenerational Transmission of Risk

Figure derived from: Buss, Entringer, Wadhwa
Maternal Inflammation during Pregnancy

Inflammation during pregnancy and increased risk for psychiatric disorders (schizophrenia, autism, ADHD)

Interleukin-6: marker of inflammation

The placental interleukin-6 signaling controls fetal brain development and behavior

How do maternal IL-6 levels during pregnancy relate to infant brain development?
Neonatal Brain Imaging

MRI soon after birth to distinguish pre- versus postnatal influences

Natural Sleep

Amygdala: Relevance to psychiatric disorders and behavioral phenotypes (social deficits, fear, stress sensitivity) linked to inflammation
Higher Maternal IL-6 Associated with Stronger Neonatal Amygdala Connectivity

Graham et al., 2018 *Biological Psychiatry*
Higher Maternal IL-6 Associated with Larger Neonatal Amygdala

\[ y = 0.231x + 0.090 \]

\[ R^2 = 0.06 \]

Graham et al., 2018 *Biological Psychiatry*
Neonatal amygdala findings associated with lower impulse control at 2-years-of-age

Higher maternal IL-6 is associated with lower child impulse control via these differences in neonatal amygdala (mediation)
Inflammatory and endocrine pathways (IL-6 and cortisol) linked to increased newborn amygdala volume and functional connectivity

Associated with behavioral risk phenotypes at 2-years-of-age

Why Intervene During Pregnancy?

Increased vulnerability...

But also can harness neuroplasticity to improve responsivity to intervention for mother and infant

Given the short window of pregnancy and early onset of psychiatric disorders, prevention is key!!
But...
Limited interventions during pregnancy

Medication
Concern regarding effects on infant
High rates of discontinuation (> 50%), with up to 70% women relapsing after discontinuation
Most women report preferring a behavioral intervention

Psychotherapy
Limited number of evidence based interventions
Limited access

Cohen et al., 2006; Dimidjian & Goodman, 2014; Yonkers et al., 2014
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Mindfulness Based Cognitive Therapy (MBCT) for Pregnancy

Evidence for:
- Stress reduction during pregnancy
- Reduced depression over pregnancy and postpartum

Group therapy
- Mindfulness and cognitive therapy
- Experiential learning
- Skills focus

Dimidjian et al., 2015, 2016
“Mindfulness means paying attention in a particular way; On purpose, in the present moment, and non-judgmentally.”

Jon Kabat-Zinn
What is mindfulness?

• Intentional awareness
• Taking a non-judgmental stance
• Acceptance (radical)
• Being in the present moment
• Experiential
• Process or journey
• Cultivating compassion
What mindfulness is not

- Relaxation
- Achieving a state of “calmness” or happiness
- Only focusing on the positive
- Getting rid of negative emotions
- Religious
- Just meditation
Mindfulness Based Cognitive Therapy (MBCT) for Pregnancy

Group of 3-8 women and 1 instructor

2hrs/week for 8 weeks

1) Recipe for Mindfulness
2) The Body, The Mind and The Breath
3) Rhythms of Motherhood
4) Opening to Difficulty and Uncertainty
5) Thoughts are Not Facts
6) How Can I Best Care for Myself
7) Expanding Circles of Care
8) Looking to the Future

Daily home practice

Dimidjian et al., 2016
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Current Study: MBCT and Maternal Programming

Neuroplasticity evidenced in brain regions implicated in postpartum psychopathology

Interventions may be able to affect the trajectory of neuroplasticity in women at-risk

Provide skills that may help at-risk women cope with inadvertent emotional consequences of neuroplasticity that may increase vulnerability to postpartum psychopathology
How does MBCT reduce risk for postpartum psychopathology?

Short answer, we don’t know...

And that is the goal of the current study

Two potential targets:
  - Emotion Regulation
  - Cognitive Control
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Two potential targets:
   - Emotion Regulation
   - Cognitive Control

Neuroplasticity involved in brain regions supporting both of these processes

Alterations to brain regions implicated in these processes observed in postpartum psychopathology

Both processes important for maternal responsivity and parenting
Does MBCT influence emotion regulation postpartum?

Mindfulness Based Cognitive Therapy (MBCT) during pregnancy

Emotion Regulation 6 weeks Postpartum
Does emotion regulation answer the question: *how does MBCT work?*
Current Study: MBCT and Developmental Programming?

“Process by which the early environment interacts with genetic and other factors to produce an individual human constitution.” — Entinger, 2007

Biological systems undergoing rapid developmental changes are especially vulnerable to organizing and disorganizing influences.

Fetal Brain Development

Kinoshita et al., 2001; Lenroot & Geidd, 2006
Applying an Experimental Framework with Clinical Intervention

Beyond correlation...does altering maternal psychological stress during pregnancy influence fetal brain development?
Can we improve the neural foundations of mental health with a time limited psychotherapeutic intervention?

MBCT for Pregnancy

Psychological Stress

Maternal-Placental-Fetal Biological State

Fetal Brain

Mother during Pregnancy

Fetal Compartment

Newborn Brain

Risk for Psychiatric Disorders

Beyond correlation...does altering maternal psychological stress during pregnancy influence fetal brain development?

Maternal psychological stress during pregnancy as a target to support fetal brain development and reduce risk
Current Study: Approach

R00 (NIMH) with focus on infant brain (N=172)
R21 (NCCIH) with focus on maternal brain (N=74)
Current Study: Who

• Pregnant female (8-18 weeks gestation)
• Age 21-45
• First time pregnant
• Single gestation
• Heightened stress
• History of mood or anxiety difficulties
• Fluent English

Exclusions:
• Current MDE, manic episode, eating disorder
• Current illicit substance use or SUD
• Major neurological or medical illness
• History of psychosis
• Known congenital, genetic, or neurological disorder of fetus
• Certain pregnancy-specific medical conditions
Current Study: Screening and Study Entry

Initial Screening (Electronic via REDCap or phone)

Eligible for Intake?

Yes

Intake Interview

Eligible for Study?

Yes

Randomize and enroll participant

No

STOP

No

STOP

No

STOP

Yes

STOP

No

STOP
Current Study: Arms

MBCT for Pregnancy

Treatment As Usual (TAU)
- Prenatal care and services as usual
- Psychoeducation session at 6-9-months postpartum
  *Introduce concept of mindfulness*
  *Engage in several brief mindfulness activities*
  *Receive MBCT workbook and audio recordings*
Current Study: Overview

Study procedures include:
- Diagnostic Interviews
- Collection of blood, urine and hair
- Neuroimaging (structural and functional MRI)
- Questionnaire measures (online via REDCap)
Currently Recruiting!

Maternalwellbeing@ohsu.edu
503-494-4476

The Roo Study on Mom and Baby Well-Being
You may have the opportunity to be in a research study about mindfulness, well being during pregnancy and infant brain development.

Have you ever experienced:
- Depression
- Low mood
- Irritability
- Overwhelming stress

Your participation may include:
- Online Eligibility Survey – 15 min
- 3 in-person visits to OHSU during pregnancy.
- Mindfulness Group Sessions (6 hrs each)
- 8 sessions during pregnancy
- OR 1 session postpartum
- Infant MRI at OHSU
- 6 Month Follow-Up Visit

You may have the opportunity to:
- Be compensated up to $479
- Receive a picture of your baby’s brain
- Participate in a mindfulness-based group therapy for pregnant women
- Are fluent in English

If interested, please call the DCAN Lab at
503-494-4476 or email maternalwellbeing@ohsu.edu

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Maternal Well-Being Study
You may have the opportunity to be involved in a mindfulness group for pregnant women

Have you ever experienced:
- Depression
- Low mood
- Irritability
- Overwhelming stress

Your participation may include:
- Online Survey – 15 min
- Interview – 3.5 hrs
- Mindfulness Group Sessions (2 hrs each)
- 4 sessions during pregnancy
- OR 4 session postpartum
- 34 Week Perinatal Visit – 1 hr
- Postpartum MRI at OHSU – 2 hrs
- 6 Month Follow-Up Visit – 1 hr

You may be eligible if you:
- Are a 21 – 45 year old woman
- Are 8 – 16 weeks pregnant
- Are in good health with an uncomplicated pregnancy
- Are fluent in English

If interested, please call the SCAN Lab at
503-494-4476 or email maternalwellbeing@ohsu.edu

Principal Investigator Dr. Alice Graham
Developmental Cognition and Neuroimaging (DCAN) Lab
Oregon Health & Science University
OHSU eIRB #19186

Principal Investigator Dr. Kristen Mackiewicz Saghete
Stress, Cognition, Affect and Neuroimaging (SCAN) Lab
Oregon Health & Science University
OHSU eIRB #19004

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1) Why should we do mental health interventions during pregnancy?

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3) How can MBCT improve maternal and infant outcomes, or in other words how may it hold promise as an intergenerational intervention? Stay tuned!
THANK YOU!

Consultants & Collaborators
Nicole Cirino, MD            Claudia Buss, PhD
Sona Dimidjian, PhD         Damien Fair, PhD
Sherryl Goodman, PhD        Pathik Wadhwa, PhD
Jodi Lapidus, PhD

SCAN Lab
Evelyn Jackson
Amy Davis
Carly Gyser
Aarika Olsen
Taylor Shank
Candice Hoke
Ray Anthony

DCAN Lab
Olivia Doyle
Mollie Marr
Eric Feczko
Eric Earl
Darrick Sturgeon
Elina Thomas
Emma Schifsky