Highlights from the Group Outcomes, Pregnancy, and Stress (GROUPS) Study

Emily Heberlein, PhD
Post-Doctoral Research Fellow
Department of Public Health Sciences, Clemson University
Department of Obstetrics and Gynecology, Greenville Health System
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• USC Advanced Support for Innovative Research Excellence (ASPIRE I) Grant Program
• Agency for Healthcare Research and Quality (AHRQ)
  – R36 dissertation grant R36HS021975
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The content is solely my responsibility and does not necessarily represent the official views of the funding organizations.
Prenatal Care: Promoting Health and Wellness from Pregnancy – 1 Year Postpartum

Risk assessment

Health promotion

Clinical and psychosocial intervention

Individual and Group Prenatal Care Models

• Individual prenatal care (IPNC): schedule of appointments consisting of physical assessments, lab and diagnostic tests, counseling, education
  Usually brief, medically focused visits, limited counseling

• CenteringPregnancy (CP) group care: combines physical assessments with healthcare provider-facilitated group education and support
  10 two-hour sessions with 8-12 pregnant women due in the same month

CenteringPregnancy™ Model

Photos courtesy of the OB Center’s CenteringPregnancy Program, Greenville Health System.
Collaboration with Greenville Health System OB/GYN Center

- Largest prenatal care provider in SC
- Medically underserved, low income women
- Historical rate of preterm birth = 16.4%
- Began offering GPNC in 2008, certified site
- Nurse Practitioners & Certified Nurse Midwives
- English-speaking, medically low-risk women entering PNC < 17 weeks = eligible for study
- Gift card incentives
- Concurrent IRB approval from GHS & USC
### GROUPS Study: Mixed Methods Design

<table>
<thead>
<tr>
<th>Quantitative Study</th>
<th>Qualitative Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promising but inconclusive evidence: CP reduces <strong>preterm birth</strong>, other positive</td>
<td>Lack of published research of <strong>women’s perspectives</strong> on the</td>
</tr>
<tr>
<td>pregnancy &amp; postpartum <strong>outcomes</strong></td>
<td>functions and benefits of PNC</td>
</tr>
<tr>
<td><strong>Longitudinal surveys:</strong> women chose PNC type, completed psychosocial, breastfeeding, food security measures</td>
<td><strong>Serial semi-structured interviews:</strong> range of women’s experiences of care, comparing IPNC to CP</td>
</tr>
<tr>
<td>124 <strong>CP</strong> and 124 <strong>IPNC</strong> women, survey 1 (12.5 weeks), survey 2 (32.7 weeks, 89%), survey 3 (6.8 weeks PP, 84%)</td>
<td>15 <strong>CP</strong> and 14 <strong>IPNC</strong> women, 136 <strong>interviews:</strong> face-to-face (~22 weeks), monthly phone calls to 6 weeks postpartum</td>
</tr>
</tbody>
</table>

**CP mechanisms and effects, subgroups who benefit**
Qualitative Study: Functions and Benefits of Prenatal Care
Reassurance, Guidance, Support, Preparation for Health, Pregnancy, Birth, Motherhood

- Individual PNC: Confirming health
- Centering: Confirming health
Confirming Baby’s and Mother’s Health

Listening to the baby’s heartbeat, measuring growth, receiving normal test results

“I always feel relieved after meeting with the provider because I think that as a mother, you naturally worry if your child’s going to be healthy and when you hear the heartbeat and the doctor says everything seems to be going well, you always feel better because no matter—if you know or not the baby’s healthy you worry about it anyway.”

Benefits

- Less stressed, calm, relieved, comforted
- Confident, prepared, motivated, knowledgeable
- Social support for questions
- Informed healthcare decision making
- Improved partner relationships
Reassurance, Guidance, Support, Preparation for Health, Pregnancy, Birth, Motherhood

Individual PNC

- Confirming health
- Preventing/monitoring complications

Centering

- Confirming health
- Preventing/monitoring complications
Preventing, Monitoring Complications

Excessive or insufficient weight gain, anemia, gestational diabetes, infection, pre-eclampsia, and preterm labor

“When they checked me each time, I’ll either see a positive or a negative result from it. So that gives me the motivation to do what I need to do as far as my health, or what I’m doing right and what I’m doing wrong with my body.”

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Reassurance, Guidance, Support, Preparation for Health, Pregnancy, Birth, Motherhood

**Individual PNC**
- Confirming health
- Preventing/monitoring complications
- Building supportive provider relationships

**Centering**
- Confirming health
- Preventing/monitoring complications
- Building supportive provider relationships
Building Supportive Provider Relationships

Open, unrushed, concerned, responsive, respectful

“When you only have one doctor, you build a relationship with them because you trust them, and that’s the type of relationship I had built with her.”

I guess [I became] just more confident to be able to talk to her about what was going on. It’s probably more of a health thing, because if something was going on I wasn’t scared to be like, “Oh, you know I got 15 minutes I might as well not even say anything about it.”

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Reassurance, Guidance, Support, Preparation for Health, Pregnancy, Birth, Motherhood

Individual PNC
- Confirming health
- Preventing/monitoring complications
- Building supportive provider relationships
- Educating & preparing

Centering
- Confirming health
- Preventing/monitoring complications
- Building supportive provider relationships
- Educating & preparing
Educating & Preparing: Individual Care

Pregnancy symptoms, labor and delivery, infant care, managing in the postpartum period, breastfeeding, stress reduction, contraception, fathers’ education

“They really don’t discuss much—except for what is wrong with you and how the baby is progressing and all that. And they asked me—then they asked me about birth control and I didn’t know what I was going to do. They just check me and tell me what I need to do to—for next time coming and all that.”

Benefits

- Less stressed, calm, relieved, comforted
- Confident, prepared, motivated, knowledgeable
- Social support for questions
- Informed healthcare decision making
- Improved partner relationships
Educating & Preparing: Centering

Pregnancy symptoms, labor and delivery, infant care, managing in the postpartum period, breastfeeding, stress reduction, contraception, fathers’ education

“So it’s like you get more answers to questions that you didn’t even think to ask.”

“It’s always nice for me personally to hear from women who have already had children because it kind of gives me a little bit more to expect, takes my worry down some.”

“Sometimes I feel like I’m not going to be strong enough or able. Then I see other girls and I think, “Well, if they can do it, I can certainly do it.”

Benefits

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- Confident, prepared, motivated, knowledgeable
- Social support for questions
- Informed healthcare decision making
- Improved partner relationships
Reassurance, Guidance, Support, Preparation for Health, Pregnancy, Birth, Motherhood

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**Benefits**
- Less stressed, calm, relieved, comforted
- Confident, prepared, motivated, knowledgeable
- Social support for questions
- Informed healthcare decision making
- Improved partner relationships
Quantitative Study
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>IPNC N=101</th>
<th>CP N=117</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>39%</td>
<td>48%</td>
<td>0.17</td>
</tr>
<tr>
<td>White</td>
<td>61%</td>
<td>52%</td>
<td></td>
</tr>
<tr>
<td><strong>No other children</strong></td>
<td>37%</td>
<td>61%</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>Married</strong></td>
<td>18%</td>
<td>18%</td>
<td>0.999</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>22%</td>
<td>24%</td>
<td>0.805</td>
</tr>
<tr>
<td>High school diploma</td>
<td>65%</td>
<td>66%</td>
<td></td>
</tr>
<tr>
<td>Associate's degree or higher</td>
<td>13%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; $10,000</td>
<td>43%</td>
<td>41%</td>
<td>0.569</td>
</tr>
<tr>
<td>10k - 19.9k</td>
<td>25%</td>
<td>34%</td>
<td></td>
</tr>
<tr>
<td>20k and over</td>
<td>31%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td><strong>Age at recruitment (mean ± SD)</strong></td>
<td>25.4 (4.9)</td>
<td>23.5 (4.9)</td>
<td>0.006</td>
</tr>
</tbody>
</table>
Comparative Effectiveness of Centering vs. Individual Care

- Multiple linear or logistic regression (main effects)
- Outcomes for subgroups (moderator analyses)
  - Psychosocial (stress, coping, depression, functioning): women with low social support or high pregnancy-related distress
  - Food security (access to enough food for healthy, active living): women who were experiencing food insecurity in early pregnancy
  - Breastfeeding: women planning to breastfeed vs. women uncertain/opposed to breastfeeding in early pregnancy
Quantitative Study: Psychosocial Outcomes
Psychosocial Factors Contribute to Birth and Postpartum Outcomes

- Stressful life events, chronic strain, anxiety, depression, interpersonal violence, low social support
- Risk factors are prevalent, often co-occurring, especially among low SES
- Contribute to preterm birth & low birth weight
- Impact on postpartum maternal and infant health

Behram & Butler, 2007; Davalos, Yadon, & Tregellas, 2012; Dole et al., 2003; Dunkel-Schetter & Glynn, 2010; Field, Diego, & Hernandez-Reif, 2006; Kramer et al., 2009; Lazinski, Shea, & Steiner, 2008; Li, Liu, & Odouli, 2009; Orr, Reiter, Blazer, & James, 2007; Shah, et al., 2011; Shah & Shah, 2010; Woods, Melville, Guo, Fan, & Gavin, 2010.
<table>
<thead>
<tr>
<th>Measure</th>
<th>Survey 1</th>
<th>Survey 2</th>
<th>Survey 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived stress (PSS)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Depressive symptoms (CES-D)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Pregnancy distress (PDQ)</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Prenatal coping (R-PCI): 2 factors, planning/preparation &amp; avoidance</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Positive &amp; negative affect (PANAS)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Pregnancy related empowerment</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Maternal – infant attachment (MPA)</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Maternal functioning (Barkin index)</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Psychosocial Results

• Centering vs. individual PNC participants did not demonstrate greater improvements or greater positive outcomes in late pregnancy or postpartum on any measures.

• Among women with high prenatal distress or low social support, Centering participants demonstrated some positive effects (next slides).
Changes in Prenatal Distress by PNC Model and Early Pregnancy Social Support Level

- Centering: Inadequate social support
  - Contrast: -2.9 points
  - p=0.03

- Centering: Adequate social support
  - Contrast: 0.9 points
  - p=0.38

- Individual: Inadequate social support

- Individual: Adequate social support

Legend:
- Early pregnancy mean
- Late pregnancy adjusted mean
Changes in Planning-Prep Coping by PNC Model and Early Pregnancy Prenatal Distress Level

- Top tertile distress: Centering, contrast: 8.3 points, p<0.01
- Lower 2 tertiles distress: Centering, contrast: 0.5 points, p=0.77

Early pregnancy mean vs. Late pregnancy adjusted mean.
Changes in Depression Scores by PNC Model and Early Pregnancy Prenatal Distress Level

- Top tertile distress:
  - Centering: contrast: -4.9 points, p=0.02
  - Individual: contrast: 0.6 points, p=0.68

- Lower 2 tertiles distress:
  - Centering: Early pregnancy vs Postpartum adjusted mean
  - Individual: Early pregnancy vs Postpartum adjusted mean
Postpartum Maternal Functioning by PNC Model and Early Pregnancy Social Support Level

- Contrast: 5.6 points, p = .03
- Contrast: -2.1 points, p = .25

Inadequate support
- Centering
- Individual

Adequate support
- Centering
- Individual

Postpartum adjusted mean
Psychosocial Outcomes Conclusion

- Women with greater psychosocial risks that Centering specifically addresses – low social support and pregnancy-related distress – experienced some benefits from participation in Centering
Quantitative Study:  
Food Security Outcomes
Food Insecurity is a Common Hardship in Pregnancy

• Affects nearly 1/3 of low-income pregnant women

• Pregnancy may increase vulnerability to food insecurity
  – Greater nutritional needs
  – Challenges in shopping/preparing nutritious meals
  – Pregnancy-related reasons for leaving the workforce

Food Insecurity’s Impact on Pregnant Women, Mothers, and Children

• In pregnancy:
  – Greater stress, anxiety, depressive symptoms
  – Greater risk for low birth weight babies and some birth defects

• In motherhood:
  – Greater risk for major depression, anxiety disorders
  – Worse infant feeding and parenting practices
  – Worse infant attachment security, mental proficiency in toddlerhood

Borders, Grobman, Amsden, & Holl, 2007; Carmichael, Yang, Herring, Abrams, & Shaw, 2007; Bronte-Tinkew, Zaslow, Capps, Horowitz, & McNamara, 2007; Coyl, Roggman, & Newland, 2002; Zaslow et al., 2009.
Food Security over Time by Prenatal Care Model

Survey 1 | Survey 2 | Survey 3
---|---|---
Centering | Insecure | Secure
26% | 16% | 58%
17% | 16% | 67%
13% | 8% | 79%
30% | 21% | 49%
34% | 10% | 56%
22% | 16% | 62%

Insecure
Marginal
Secure
Adjusted Predicted Probabilities of Late Pregnancy Food Security

<table>
<thead>
<tr>
<th></th>
<th>All Participants</th>
<th>Initially food insecure</th>
<th>Initially food secure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjusted Predicted Probability</td>
<td>0.66</td>
<td>0.85</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>0.67</td>
<td>0.76</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.35</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Adjusted predicted probability of food security
- 95% confidence interval

**p<0.001**

**p<0.001**

**p=0.002**

Individual Centering

Initially food insecure

Initially food secure
Adjusted Predicted Probabilities of Postpartum Food Security

<table>
<thead>
<tr>
<th>All Participants</th>
<th>Initially food insecure</th>
<th>Initially food secure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.78</td>
<td>0.89</td>
<td>0.88</td>
</tr>
<tr>
<td>0.57</td>
<td>0.76</td>
<td>0.95</td>
</tr>
</tbody>
</table>

- Individual Centering

- Adjusted predicted probability of food security
- 95% confidence interval

p = 0.049
p = 0.052
p = 0.067
## Comparisons of Food Security Survey Items Across Surveys by PNC Model

<table>
<thead>
<tr>
<th>Item</th>
<th>Survey 1</th>
<th>Survey 2</th>
<th>Survey 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>The food you bought just didn’t last, and you didn’t have money to get more.</td>
<td>CP 32%</td>
<td>20%</td>
<td>16%</td>
</tr>
<tr>
<td></td>
<td>IPNC 37%</td>
<td>34%</td>
<td>21%</td>
</tr>
<tr>
<td>You couldn’t afford to eat the healthy foods that you wanted to.</td>
<td>CP 35%</td>
<td>27%</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td>IPNC 42%</td>
<td>40%</td>
<td>32%</td>
</tr>
<tr>
<td>Did you ever cut the size of or skip meals because there wasn’t enough money for food?</td>
<td>CP 15%</td>
<td>7%</td>
<td>8%</td>
</tr>
<tr>
<td></td>
<td>IPNC 17%</td>
<td>15%</td>
<td>16%</td>
</tr>
<tr>
<td>Did you ever eat less than you felt you should because there wasn’t enough money for food?</td>
<td>CP 14%</td>
<td>8%</td>
<td>9%</td>
</tr>
<tr>
<td></td>
<td>IPNC 19%</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>Were you ever hungry but didn’t eat because there wasn’t enough money for food?</td>
<td>CP 10%</td>
<td>3%</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>IPNC 11%</td>
<td>7%</td>
<td>12%</td>
</tr>
</tbody>
</table>

*Bold = significantly different proportions between group and individual care at the given time point at p<0.05, italics = different at p<0.10.*
Quantitative Study: Breastfeeding Outcomes
Breastfeeding Rates by Prenatal Care Model

- **Any**: Hospital discharge
- **Exclusive**: Hospital discharge
- **Any**: Six weeks' postpartum
- **Exclusive**: Six weeks' postpartum

*All differences by PNC model*  p<0.05
Breastfeeding Rates for Women Uncertain/Opposed to Breastfeeding

<table>
<thead>
<tr>
<th></th>
<th>Hospital Discharge</th>
<th>Six Weeks’ Postpartum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any breastfeeding</td>
<td>0.69</td>
<td>0.16</td>
</tr>
<tr>
<td>Exclusive breastfeeding</td>
<td>0.52</td>
<td>0.28</td>
</tr>
<tr>
<td>Individual:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any breastfeeding</td>
<td>0.57</td>
<td>0.11</td>
</tr>
<tr>
<td>Exclusive breastfeeding</td>
<td>0.39</td>
<td>0.04</td>
</tr>
</tbody>
</table>

*p<0.05*
Breastfeeding Rates for Women Planning to Breastfeed

<table>
<thead>
<tr>
<th></th>
<th>Hospital Discharge</th>
<th>Six Weeks’ Postpartum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Individual</td>
<td>Group</td>
</tr>
<tr>
<td>Any breastfeeding</td>
<td>0.93</td>
<td>0.86</td>
</tr>
<tr>
<td>Exclusive breastfeeding</td>
<td>p&lt;0.05</td>
<td>p&lt;0.05</td>
</tr>
</tbody>
</table>
Limitations

- Timing and frequency of data collection
  - Simultaneous qual and quant = incomplete outcomes measurement
  - Effectiveness of changes in planning-prep coping?
  - Full extent of psychosocial effects of PNC in late pregnancy?
- Selection bias
  - Unmeasured group differences introduced bias?
  - Use of change scores eliminated time-invariant bias
- Limited views of early PNC experiences, IPNC first time mothers and CP women with children
- Overlapping providers
Implications & Future Research

• Insight into outcomes important to women
  – include in health policy and research, provider training
• CP has greater psychosocial effects for some women
  – Recruit and retain women with higher risk
  – Examine heterogeneous effects in research
• Measurement of stress and coping
  – Overlap amongst scales, incomplete assessment of positive outcomes – better way to measure?
• Health behaviors and postpartum maternal functioning
• Use results to design larger studies powered to detect birth outcomes
Thank you!

Questions or comments?
Selected References


Selected References (cont.)


