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The Comparative Effectiveness of Group Prenatal Care on Women's Psychosocial Health

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by

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ABSTRACT

Background: High rates of adverse birth outcomes persist in the United States despite increased access to individual prenatal care (IPNC). Psychosocial factors influence birth outcomes and affect infant and child development and maternal functioning. Group prenatal care (GPNC) combines individual physical assessments and facilitated group education and support. Studies of GPNC show promising results, including lowered preterm birth rates, but the GPNC psychosocial mechanisms influencing birth outcomes are unclear.

Methods: Surveys at study enrollment (N=248), late pregnancy, and six weeks postpartum assessed psychosocial effects of each PNC model. Multiple regression models and planned moderator analyses tested whether GPNC participants had better outcomes compared to IPNC, as main effects and for at-risk subgroups. Frequent, brief semi-structured interviews with 29 women during pregnancy through six weeks postpartum were conducted and analyzed to describe important PNC functions and how experiences and benefits differed according to the PNC model women selected.

Results: GPNC participants did not demonstrate overall greater improvements in psychosocial outcomes compared to IPNC participants. Among women with low survey 1 social support, GPNC vs. IPNC participants demonstrated greater improvements in late-pregnancy prenatal distress and postpartum negative affect. Among women with high initial prenatal distress, GPNC vs. IPNC participants demonstrated greater improvements in planning-preparation coping in late pregnancy and postpartum

depressive symptoms. In the qualitative interviews, women described four PNC functions: confirming baby and mother's health, preventing and monitoring complications, educating and preparing, and building supportive relationships. Benefits included stress reduction, increased confidence, preparation, and motivation to change health behaviors, and informed decision making. While individual experiences varied, GPNC participants described greater educational and psychosocial benefits compared to IPNC participants.

Implications: This study contributes to the existing PNC literature by explicating functions of PNC for women and showing that GPNC confers additional educational and psychosocial benefits compared to IPNC, particularly among women with greater psychosocial risk. Efforts to increase availability of high-quality GPNC can provide women with choices in PNC. The qualitative results indicate functions and benefits important to include in future PNC research. Large randomized studies are needed to establish conclusively the biological and psychosocial benefits of GPNC for women.

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CHAPTER 1: INTRODUCTION

1.1 Statement of the Problem

The Institute of Medicine has identified comparing clinical interventions to improve preterm birth and low birth weight in the highest tier of priority topics for their research agenda on comparative effectiveness (Institute of Medicine, 2009). Low birth weight and preterm babies face immediate and long-term health and developmental problems (Behrman & Butler, 2007; McCormick, Litt, Smith, & Zupancic, 2011; Saigal & Doyle, 2008). Annual minimum estimates for the costs in the United States of prematurity total $26.2 billion dollars ($51,600 per child), and include medical care for the infant, maternal delivery costs, early intervention programs, special education for the four most common conditions associated with prematurity, and lost household productivity (Behrman & Butler, 2007).

Prenatal care has been the foremost strategy to improve pregnancy outcomes in the United States. Increasing access to individual prenatal care (IPNC) in the last twenty years has not decreased preterm births, rates of low birth weight, or reduced racial disparities in birth outcomes (Fiscella, 1995; Lu, Tache, Alexander, Kotelchuck, & Halfon, 2003; Walford, Trinh, Wiencrot, & Lu, 2011). In 2011, 14.1% of live births in South Carolina were preterm and 9.9% of live births were low birth weight, among the highest rates in the United States and with large racial disparities (Martin, Hamilton, Ventura, Osterman, & Matthews, 2013).

Psychosocial factors during pregnancy, including stress, anxiety, depression, and coping responses, are garnering increased attention as critical contributing factors to poor birth outcomes (Dunkel Schetter, 2011). These psychosocial factors also affect infant and child development and maternal functioning postpartum (Lobel, Hamilton, & Cannella, 2008). Research is needed to test interventions that help women manage stress and anxiety (Dunkel Schetter, 2011). Prenatal care provides an important platform for intervention to improve birth outcomes (Behrman & Butler, 2007), and combining psychosocial health promotion within prenatal care promises to be cost-effective, feasible, and preferred by women (Ickovics, 2008; Ickovics et al., 2011).

Studies of group prenatal care (GPNC), where individual physical assessments are combined with facilitated group education and support (Rising, Kennedy, & Klima, 2004), have established some promising results, including high rates of prenatal care use and satisfaction, improvements in preterm birth rates, and improvements in some psychosocial outcomes among women experiencing high levels of prenatal stress (Ickovics et al., 2007; Ickovics, et al., 2011; Novick et al., 2011; Picklesimer, Billings, Hale, Blackhurst, & Covington-Kolb, 2012). Because GPNC provides social support and more time for visits, increasing patient education, motivation and skills for self-care, and empowerment, GPNC holds great potential for improving both psychosocial and birth outcomes (Rising, et al., 2004).

The specific GPNC psychosocial mechanisms hypothesized to lead to improved birth outcomes have not been established. No research study to date on GPNC has comprehensively investigated the range of psychosocial factors—particularly stress, anxiety, depression, and coping—that are known to influence birth outcomes and may be

well-suited for group intervention. While promising, results of one large, well-designed randomized control trial assessing psychosocial and birth outcomes for an HIV prevention intervention bundled with GPNC used a limited range of psychosocial outcome measures with a homogenous population (Ickovics, et al., 2007; Ickovics, et al., 2011). Furthermore, no research has explicitly examined how GPNC affects pregnant women's management of stress and anxiety; qualitative studies have primarily focused on describing GPNC experiences, usually assessed retrospectively. Developing and testing a conceptual model for GPNC that incorporates intermediate outcomes and group processes theorized to affect pregnancy outcomes is critical for moving the research and clinical practice of prenatal care (PNC) forward (Sheeder, Weber Yorga, & Kabir-Greher, 2012).

1.2 Research Study

Purpose of Research Study

This research aims to compare the effects of GPNC to IPNC on women's psychosocial health using two strategies: comparing IPNC and GPNC participants' psychosocial health using a range of quantitative measures in consonance with a stress and coping conceptual framework, and interviewing participants on their perceptions of the functions and outcomes of GPNC and IPNC in the context of their pregnancies and early postpartum experiences.

This study addresses several shortcomings in the GPNC literature. First, this study maximizes the probability of detecting improvements in psychosocial outcomes through using a wider range of valid, reliable measurement scales and through recruiting an adequately powered study sample. Second, the outcomes are derived from a theory-

driven conceptual model tied to the field's current understanding of psychosocial factors' influence on birth outcomes and postpartum maternal adjustment. Third, the concurrent qualitative interviews provide rich data on how the two models of PNC affect women on an ongoing basis, allowing for a critical appraisal of the psychosocial outcomes hypothesized in the conceptual model and quantitative study and the possible identification of different, salient processes and outcomes for further research.

Context of Research Study

Individual Prenatal Care

IPNC for women with uncomplicated pregnancies involves monthly provider visits for the first 28 weeks of pregnancy, every two to three weeks until 36 weeks, then weekly. Visits include an initial medical and psychosocial history, and ongoing assessment of weight, blood pressure and urine screens for protein levels (to detect pre-eclampsia), fetal heart rate, fetal growth, and fetal movement as well as patient education on pregnancy and prenatal care, options for intrapartum (delivery) care and educational programs, breastfeeding, and pediatrician selection. Women receive routine screenings as well as specialized tests, interventions, and referrals depending on risk factors and the course of pregnancy (American Academy of Pediatrics & American College of Obstetricians and Gynecologists, 2007). Prenatal care visits are usually short and focused on identifying medical risks, with limited opportunity for counseling and support (Novick, 2009).

Group Prenatal Care

In the CenteringPregnancy (CP) model of GPNC, prenatal care is provided in ten 2-hour group sessions with eight to twelve women with due dates in the same 4-6 week

range. This model addresses the Institute of Medicine's principles to improve healthcare delivery systems (Institute of Medicine, 2001; Rising, et al., 2004) and has been implemented in several hundred practices, primarily in the United States (Manant & Dodgson, 2011). The model developer has established a site training and certification process to assure consistency and quality in implementation (Centering Healthcare Institute, n.d.).

Providers (usually nurse midwives) assess each woman's medical and psychosocial history, and perform the same ongoing medical assessment described for IPNC within the group space. Participants take and record their own blood pressure and weight. The groups focus on issues related to pregnancy, childbirth, and parenting, providing for expanded opportunity for the education and support functions of prenatal care (Rising, et al., 2004). The topics include nutrition, exercise, relaxation techniques, pregnancy problems and comfort measures, infant care and feeding, communication, self-esteem, abuse issues, parenting, and preparation for childbirth (Massey, Rising, & Ickovics, 2006). Based on individual assessment and issues arising during groups, medical and psychosocial interventions are provided as needed. GPNC provides an opportunity for women to increase their social support, change norms on health behaviors, and share information with one another. Significant others/partners are usually included in the sessions (Massey, et al., 2006).

Research Site

The study occurred at the OB/GYN Center at the Greenville Health System (GHS) in Greenville, South Carolina. The Center is South Carolina's largest provider of prenatal care, serving more than 2,580 women in 2010 (Greenville Hospital System,

n.d.), most of whom are medically underserved. Nearly all of the clinic's population is covered by Medicaid or is low-income; 30% are African-American, 29% are Latina; 50% have less than a high school education, 28% have a high school diploma, and 67% are unmarried (S. Covington-Kolb, GHS, personal communication, April 17, 2012). Historical rates of preterm births are 16.4% (Picklesimer, et al., 2012). Supported by a grant from the March of Dimes, the OB/GYN Center began offering the CP model of GPNC in 2009 to improve prenatal care and birth outcomes. In February 2010, the Centering HealthCare Institute certified the OB/GYN Center as providing consistent, high quality GPNC according to the CP model.

Framework of Research Study

The study employed a convergent parallel mixed-methods design, collecting quantitative and qualitative data concurrently (Creswell & Plano Clark, 2011). The convergent design allows the researcher to combine the advantages of both methods (e.g., the sample size and generalizability of quantitative methods with the detailed, extensive small sample of qualitative methods) to triangulate findings, explain quantitative findings, or bring together results to build a more thorough understanding of a process or phenomenon (Creswell & Plano Clark, 2011). The primary goal of using a convergent design in this research is to build a broader, detailed understanding of GPNC effects compared to IPNC. Surveys conducted at two points during pregnancy and at six weeks postpartum assessed the psychosocial effects of each prenatal care model. Frequent, brief interviews with women during pregnancy through six weeks postpartum investigated how prenatal care affected women's day to day lives, providing opportunities to explain the quantitative results and to uncover new themes.

1.3 Aims and Research Questions

This study addressed two specific aims.

Manuscript 1.

Specific Aim 1. Test the hypothesis that GPNC (vs. IPNC) participants demonstrate significantly greater positive psychosocial outcomes in their third trimester of pregnancy and at 6 weeks postpartum.

> **Hypothesis 1a.** GPNC participants demonstrate significantly greater positive changes compared to IPNC participants in pregnancy-related anxiety and prenatal coping in late pregnancy, and in perceived stress, depressive symptoms, and positive and negative affect in late pregnancy and at six weeks' postpartum.
>
> **Hypothesis 1b.** GPNC participants demonstrate significantly higher levels of pregnancy-related empowerment in late pregnancy, and higher levels of postpartum maternal-infant attachment and maternal functioning.
>
> **Hypothesis 1c.** GPNC participants at greater psychosocial risk (i.e., entering the study with low social support or high pregnancy-related anxiety) will experience greater positive psychosocial outcomes compared to IPNC participants with similar risks.
>
> **Hypothesis 1d.** GPNC participants who are black or first-time mothers will experience greater positive psychosocial outcomes compared to IPNC participants in these demographic groups.

Manuscript 2.

Specific Aim 2. Develop an in-depth understanding of the meanings and effects women attribute to PNC on their well-being and health and their babies' health throughout

pregnancy and into the early postpartum period, in the context of their pregnancies and life experiences.

> **Research Question 2a.** How do women describe their PNC experiences, specifically the functions of PNC that they value and the effects on their well-being, health, and their babies' health?
>
> **Research Question 2b. How** do these experiences differ by PNC model and for women based on parity?

Chapter 2 summarizes the literature relevant to this research study and Chapter 3 describes the methodology of this mixed-methods research. Chapter 4 includes the two manuscripts as outlined above. Chapter 5 synthesizes the quantitative and qualitative findings, and presents implications, conclusions, and areas for future research.

CHAPTER 2: BACKGROUND AND SIGNIFICANCE

2.1 Birth Outcomes in the United States

The rate of preterm births in the United States increased more than one third between 1980 and 2006 to 12.8%; while it has declined slightly each year since 2006, the preterm birth rate remained high at 11.7% in 2011 (Martin, et al., 2013). The rate of low birth weight in 2011 was 8.10%, also showing a slow decline in the prior five years (Martin, et al., 2013). Despite small improvements in the overall rates, racial disparities in these birth outcomes persist. In 2011, the preterm birth rate for non-Hispanic white women was 10.5%, compared to 16.8% for non-Hispanic black women; the low birth weight rate for non-Hispanic white women was 7.1%, compared to 13.3% for non-Hispanic black women (Martin, et al., 2013). Many low birth weight and preterm babies face health and developmental problems, including immediate respiratory, gastrointestinal, and neurological problems and long term growth, cognitive, behavioral, health, and hearing and vision problems (Behrman & Butler, 2007; McCormick, et al., 2011; Saigal & Doyle, 2008). Annual minimum estimates for the costs of prematurity in the United States total $26.2 billion dollars ($51,600 per child), and include medical care for the infant, maternal delivery costs, early intervention programs, special education for the four most common conditions associated with prematurity, and lost household productivity (Behrman & Butler, 2007). While the trend of increasing preterm birth and low birth weight rates may have begun to reverse, continued high rates and racial

disparities continue, and birth outcomes remain an important public health focus (U.S. Department of Health and Human Services, 2013). The Institute of Medicine has identified comparing clinical interventions to reduce preterm birth and low birth weight in the highest tier of priority topics for their comparative effectiveness research agenda (Institute of Medicine, 2009).

2.2 The Role of Maternal Psychosocial Factors in Birth Outcomes, Infant Development, and Maternal Functioning Postpartum

The etiology of birth outcomes is complex, involving behavioral, psychosocial, socio-demographic, community, environmental, and medical factors (Behrman & Butler, 2007). Psychosocial factors associated with poor birth outcomes include stress, anxiety, depression, trauma (including intimate partner violence), racism, pregnancy intendedness, poor social support, and low personal resources (Behrman & Butler, 2007; Dole et al., 2003; Field, Diego, & Hernandez-Reif, 2006; Finer & Henshaw, 2006; Kramer et al., 2009; Li, Liu, & Odouli, 2009; Orr, Reiter, Blazer, & James, 2007; Shah et al., 2011; Shah & Shah, 2010). While prevalence estimates of these different psychosocial risk factors vary, partly as the result of different assessment methods and populations, these factors are prevalent and often co-occurring, particularly among women with low socio-economic status (Woods, Melville, Guo, Fan, & Gavin, 2010).

The effects of these psychosocial factors are mediated by how women appraise and cope with their particular situations (Lazarus & Folkman, 1984) and their personal resources, including social support, optimism, and socio-economic status (Dunkel Schetter, 2011). Stress in pregnancy has been conceptualized as episodic (e.g., life events, catastrophes, and daily hassles), chronic, or as emotional states of depression or anxiety

(Dunkel-Schetter & Glynn, 2010). Different women will respond to the same type of stress differently, and individual coping strategies may change over time and vary in their effectiveness (Hamilton & Lobel, 2008; Messer, Dole, Kaufman, & Savitz, 2005). Despite methodological challenges and measurement differences, producing inconsistent findings (Catov, Abatemarco, Markovic, & Roberts, 2010; Chen, Grobman, Gollan, & Borders, 2011; Dunkel Schetter, 2011), stress processes have plausible biological mechanisms (Dunkel-Schetter & Glynn, 2010; Dunkel Schetter, 2011; Latendresse, 2009) and are recognized as important factors contributing to pregnancy and birth outcomes (Dunkel-Schetter & Glynn, 2010; Dunkel Schetter, 2011; Hobel, Goldstein, & Barrett, 2008).

These psychosocial factors experienced during pregnancy also affect infant development and maternal well-being postpartum, and thus are important to address for reasons beyond their influence on pregnancy outcomes. A growing body of research has established links between stress exposure in utero and negative outcomes in infancy and childhood, including behavioral and emotional problems (Lazinski, Shea, & Steiner, 2008). Women who experience maternal distress from the transition to motherhood may experience worse mental health, poorer role development, lower quality relationships, social engagement, and quality of life (Emmanuel & St John, 2010). A recent review of the literature suggests that untreated antenatal depression is associated with negative outcomes in infants and children (Davalos, Yadon, & Tregellas, 2012). Antenatal depression and anxiety are strong predictors of postpartum depression (Heron, O'Connor, Evans, Golding, & Glover, 2004; Robertson, Grace, Wallington, & Stewart, 2004) and

maternal depression negatively affects parenting quality and health (National Research Council and Institute of Medicine, 2009).

2.3 Prenatal Care Goals and Effectiveness in Improving Birth Outcomes

According to the United States Public Health Service Expert Panel on the content of prenatal care, the goals of prenatal care services are to promote the health and wellness of the pregnant woman, the fetus, the baby and family through the first year postpartum (US Public Health Service, 1989). PNC objectives involve reducing maternal mortality and morbidity, reducing preterm birth, low birth weight, and congenital anomalies, and other infant morbidities, increasing maternal well-being, self-image, and self-care before, during, and after pregnancy, reducing unintended pregnancy and risks to maternal health, and promoting healthy infant and family development (e.g., promoting immunizations, health supervision, positive parent-infant interactions, and reducing child abuse, neglect, injuries, and preventable illnesses) (United States Public Health Service, 1989). Prenatal care (PNC) provides early and ongoing risk assessment, health promotion, and medical and psychosocial intervention, and services should be available, used, and include preconception care (US Public Health Service, 1989). Developed in response to the Institute of Medicine's report on preventing low birth weight, these objectives provide the framework for prenatal care that is used 25 years later (Krans & Davis, 2012).

Individual prenatal care has been the foremost strategy to improve birth outcomes in the United States, with policy efforts largely directed toward increasing access to prenatal care through the expansion of Medicaid eligibility without concurrently addressing the content and timing of PNC (Alexander & Kotelchuck, 2001; Krans & Davis, 2012). The proportion of women initiating prenatal care in their first trimester of

pregnancy increased steadily through the 1990s and 2000s to 82% in 2007 (Krans & Davis, 2012). Increasing access to individual prenatal care (IPNC) in the last twenty years has not decreased preterm births, rates of low birth weight, or reduced racial disparities in birth outcomes (Fiscella, 1995; Lu, et al., 2003; Walford, et al., 2011).

While improved access remains a policy goal, particularly for women at risk for poor birth outcomes (e.g., black women) who still have lower rates of early and adequate PNC use, the traditional model of IPNC must be re-examined (Lu, et al., 2003; Walford, et al., 2011). With more visits recommended late in pregnancy, the timing of IPNC limits its potential impact on risks that may exert their influence very early in pregnancy (Lu, et al., 2003). Because of the limited time for most prenatal care appointments, the substance of IPNC focuses more on identifying medical risks, not in providing psychosocial interventions or health promotion; women may be referred to childbirth education or ancillary services to address these needs (Novick, 2009; Walford, et al., 2011).

2.4 Ancillary Prenatal Interventions to Reduce Psychosocial Risk Factors

Prenatal interventions beyond IPNC have attempted to reduce psychosocial risk factors. Evidence indicates that some interventions can effectively prevent postpartum depression (Clatworthy, 2012), and improve stress, anxiety, and/or mood (Beddoe & Lee, 2008; Marc et al., 2011; Urizar et al., 2004; Urizar Jr & Muñoz, 2011; Wesley, 2006), although review studies have concluded that phone, home visitation, or clinic-based interventions to reduce risk factors with women at high risk for poor pregnancy outcomes have varying or null effects on birth outcomes (Dennis & Kingston, 2008; Hodnett, Fredericks, & Weston, 2010; Issel, Forrestal, Slaughter, Wiencrot, & Handler, 2011).

One large randomized control trial testing one-on-one evidenced-based interventions after routine prenatal medical appointments found that the interventions helped women decrease smoking, environmental tobacco exposure, intimate partner violence, and depression, but medical risk factors (e.g. hypertension, previous preterm birth), not psychosocial factors, influenced pregnancy outcomes (Joseph et al., 2009; Subramanian et al., 2011).

A number of limitations in both intervention and study design contribute to these mixed, inconclusive results. Interventions are generally provided later in pregnancy (second or third trimester), and methods for identifying high-risk women vary and may not be highly accurate (Hodnett, et al., 2010). Most studies do not provide detail on the theoretical basis for interventions or measure impacts on a variety of outcomes. Randomization is difficult because prenatal care is considered an essential service (Alexander & Kotelchuck, 2001). Across studies, recruitment and retention rates in programs women must attend outside of prenatal care appointments vary substantially (Clatworthy, 2012; Subramanian, et al., 2011). Interventions with some indication of effectiveness often require significant time from participants (Duncan & Bardacke, 2010), which may not be possible for many women already balancing substantial work, motherhood, and household responsibilities. Lastly, most intervention studies are not powered to detect differences in birth outcomes.

2.5 Effectiveness of Group Prenatal Care on Birth and Psychosocial Outcomes

Group prenatal care (GPNC) addresses many of the shortcomings of IPNC and other supplemental prenatal interventions to improve psychosocial health and birth outcomes (Vonderheid, Kishi, Norr, & Klima, 2011). Women do not need to be screened

or referred to an ancillary program and the group setting provides time for education and support not common in IPNC. GPNC research has found some promising results, although these results are not conclusive or comprehensive.

Several studies have found improvements in birth weight or reductions in prematurity for GPNC participants compared to IPNC participants. Adolescents participating in GPNC (N=124) had lower rates of preterm birth (10.5%) and low birth weight (8.9%) in bivariate analyses with two historical comparison groups of adolescents (N=144, 25.7% preterm, 14.6% low birth weight and N=233, 23.2% preterm, 18.3% low birth weight, all p-values <0.05) (Grady & Bloom, 2004). In a small study of Hispanic women (N=216) that did not control for selection bias, a smaller proportion of women selecting GPNC had a preterm birth (5% to 13%, p=0.04) (Tandon, Colon, Vega, Murphy, & Alonso, 2012). A prospective, matched control study among predominantly young, black women (N=458), found a significant improvement in birth weight in GPNC ($p<0.01$); among preterm babies, the increased birth weight was the result of longer gestation. This study did not detect an impact on the overall preterm birth rate (Ickovics et al., 2003). A large retrospective cohort analysis among an ethnically diverse population (N=4,083), controlling for many risk factors known to impact birth outcomes, found a 47% reduction in preterm birth (7.9% vs. 12.7%, p=0.01) (Picklesimer, et al., 2012). These effects also were observed among nulliparous women and heightened among black women (Picklesimer, et al., 2012). Another large retrospective cohort analysis using propensity score matching (N=6,155) found GPNC participants had greater mean gestational age, higher birth weights, and lower odds of fetal death, but no difference in the odds of preterm birth or low birth weight (Tanner-Smith, Steinka-Fry, & Lipsey,

2013). A small randomized control trial (RCT), conducted at two sites in the military with 335 women, did not find differences in preterm birth or birth weight (Kennedy et al., 2011). A large, federally funded randomized control trial (RCT) of GPNC bundled with an HIV prevention program with primarily young, black women (N=1,047) found a 33% reduction in preterm birth (9.8% GPNC vs. 13.8% IPNC, p=0.045) with stronger effects among black women (Ickovics, et al., 2007). These studies reflect a range of methodological vigor and sample size; among the studies with sufficient power to detect differences in birth outcomes, the results suggest that women who participate in GPNC may have improved rates of preterm birth or increased gestational age, and that effects may be greater among young, black women.

Improved patient engagement, health knowledge and behaviors, social support, self-efficacy, and stress are theorized to be important GPNC secondary outcomes and mechanisms affecting birth outcomes, although research has not substantiated these hypotheses. In a study with pregnant teens, (N=10 in GPNC, N=63 in IPNC), more GPNC participants had high scores on a posttest measure of pregnancy knowledge, while no group differences were detected for self-esteem or locus of control (Grady & Bloom, 2004). In a pretest-posttest study with 98 women (N=50 in GPNC, N=48 in IPNC), GPNC participants demonstrated increased pregnancy knowledge at posttest (p=0.03), but no group differences were detected for perceived social support, fetal health locus of control, or participation and satisfaction with care (Baldwin, 2006). In a prospective quasi-experimental study of Hispanic women, GPNC participants did not demonstrate greater healthy behaviors, knowledge of care, or self-esteem in late pregnancy (N=24 in GPNC, N=25 in IPNC) or depression or satisfaction with care postpartum (N=18 in

GPNC N=15 in IPNC), and IPNC participants had *higher* self-esteem postpartum (p=0.037) (Robertson, Aycock, & Darnell, 2009). In another quasi-experimental study with Hispanic women, GPNC participants (N=126) were compared with a demographically similar control group (N=47). GPNC participants had higher rates of PNC use, attendance at postpartum checkups, and establishment of a medical home for their baby (Tandon, Cluxton-Keller, Colon, Vega, & Alonso, 2013). Small sample sizes, lack of statistical control for selection bias, no reported process evaluation, and use of measurement scales without evidence of their reliability and validity are common study limitations, potentially contributing to the mixed or null results.

Several larger studies with stronger designs have examined specific health behaviors, aspects of patient engagement, and/or psychosocial outcomes, sometimes in concert with birth outcomes. Tanner-Smith and colleagues conducted a retrospective cohort analysis comparing 158 GPNC participants with a propensity score matched IPNC sample (N=235), finding that GPNC participants were less likely to have excessive gestational weight gain (Tanner-Smith, Steinka-Fry, & Gesell, 2013). In a retrospective cohort analysis of Medicaid-eligible women, GPNC participants were more likely than a propensity score-matched group of IPNC participants (combined N=1,100) to use postpartum family planning services at six and 12 months postpartum (Hale, Picklesimer, Billings, & Covington-Kolb, 2014). In the RCT conducted at two military settings described above, women randomly assigned to GPNC were six times more likely to receive an adequate number of PNC visits; women were also more likely to be satisfied with their care ($p<0.001$) and better able to participate in their care ($p<0.001$) (Kennedy, et al., 2011). No group differences were found in perceived stress, prenatal distress,

perceived social support, depression, childbirth self-efficacy, or prenatal health behaviors (Kennedy, et al., 2011). The larger RCT conducted by Ickovics and colleagues found that women randomly assigned to GPNC reported greater satisfaction with care, as well as greater prenatal knowledge and readiness for labor and delivery. While there were no differences in changes in psychosocial outcomes over time between PNC models, GPNC participants experiencing high perceived stress during early pregnancy demonstrated greater increases in self-esteem ($p=0.009$), and greater decreases in stress ($p=0.005$) and social conflict ($p=0.008$) in late pregnancy, and greater decreases in social conflict ($p=0.004$) and depression ($p=0.02$) at one year postpartum (Ickovics, et al., 2011). In sum, this evidence suggests GPNC may have greater effects than IPNC on specific aspects of health knowledge or behaviors, use of and satisfaction with PNC, and psychosocial health, and that some effects may only be salient among women with higher psychosocial risk, but more research is needed to substantiate these findings. The Ickovics and colleagues' RCT is the only study reviewed that examined whether GPNC had heterogeneous treatment effects for women based on psychosocial risk or demographic categories.

2.6 Experiences of IPNC and GPNC

The outcomes assessed in the studies comparing IPNC and GPNC reflect a limited range of clinical outcomes and psychosocial measures that may not reflect women's priorities and experiences with PNC. This section provides a summary of key literature examining PNC experiences from women's perspectives.

Women's experiences with IPNC

While many studies report generally positive patient satisfaction with prenatal care, satisfaction measures provide little insight into the subjective experiences of care, and relatively little research has engaged with women to learn how they describe the content, purposes, and benefits of IPNC (Novick, 2009). Studies of women's perspectives on their experiences with IPNC have generally focused on three broad topics: assessing barriers and facilitators of access to IPNC; preferences and experiences related to provider relationships; and analyses of IPNC content areas provided (e.g., risk assessments, health promotion).

Multiple studies have assessed perceived barriers and facilitators to accessing PNC. In a review of studies on women's perceptions of access to PNC in the United States, barriers included maternal motivations tied to unintended pregnancies (e.g., unaware of pregnancy, delaying disclosure of pregnancy, considering abortion, depression), PNC beliefs (e.g., fear of medical procedures, value of PNC), as well as barriers posed by transportation, childcare, and financial circumstances (Phillippi, 2009). Structural barriers to care included availability and accessibility of clinics and appointments, waiting times, costs of services, and perceptions of PNC quality and provider attitudes (Phillippi, 2009). Other studies have found that women using substances may delay or avoid PNC because they feared disclosing their substance use or providers' judgment of them (Mikhail & Curry, 1999; Milligan et al., 2002). Perceived experiences of racism may also affect women's decisions on when to initiate PNC (Slaughter-Acey, Caldwell, & Misra, 2013). Fewer studies have assessed women's perspectives on motivators or perceived benefits for attending PNC. Across studies,

women were primarily motivated to attend PNC by their concern for their baby's health, and to a lesser extent by the attitudes of their support networks (Phillippi, 2009). Women, upon their entry to PNC, have also identified learning about positive health habits and labor and delivery as potential benefits of PNC (Fuller & Gallagher, 1999).

Multiple U.S. studies have established women's perspectives on the value, characteristics, and benefits of positive IPNC patient-provider relationships (Novick, 2009). For example, in a focus group study with 22 black pregnant women receiving prenatal care at two urban hospital based clinics, women identified a number of preferences for provider relationships, including provider continuity, quality communication (i.e., providers ask and answer questions without rushing and provide clear explanations of medical terminology), and respectful, compassionate, individualized treatment (Lori, Yi, & Martyn, 2011). In a mixed methods study with black women of mixed literacy levels receiving Medicaid, focus groups (N=18) identified the same valued aspects of communication as Lori and colleagues (2011) across literacy levels (Bennett, Switzer, Aguirre, Evans, & Barg, 2006).

The nature of women's *actual* relationships with their IPNC providers influences a number of outcomes. In a focus group study with 33 prenatal and postpartum women (67% black), women identified provider continuity, effective communication, compassion, and perceived competence as factors influencing trust; women with less trust were less receptive to following provider guidance (Sheppard, Zambrana, & O'Malley, 2004). In an analysis of focus group data with 87 racially mixed, low-income women, women described largely negative experiences across four dimensions of patient centeredness (provider listened carefully, explained things, showed respect, and spent

enough time); these experiences affected women's engagement in their care and in some instances caused distress (Wheatley, Kelley, Peacock, & Delgado, 2008). Semi-structured interviews with Hispanic women (N=125) similarly indicated that rushed, impersonal interactions, often concomitant with language barriers, impeded women from asking questions, understanding provider information, and reduced motivation for attending future appointments (Tandon, Parillo, & Keefer, 2005).

A third topic of research on U.S. women's experiences with IPNC examines IPNC content areas, with few studies published in the last ten years. In an early study measuring women's reports on receiving seven different health messages during PNC recommended by the U.S. Public Health Service's Expert Panel on prenatal care, only 32% of respondents received advice on all recommended topics. In this nationally representative sample from the 1988 National Maternal and Infant Health Survey, 53% received breastfeeding information, about two-thirds received information about alcohol, tobacco, and illegal drug use, and 72% received information about appropriate weight gain (Kogan, Alexander, Kotelchuck, Nagey, & Jack, 1994). More recent studies indicate that breastfeeding discussions during initial prenatal visits, as recommended by practice guidelines, may still occur infrequently (Demirci et al., 2013) and overweight or obese pregnant women do not receive adequate provider guidance on gestational weight gain and exercise despite wanting this information (Stengel, Kraschnewski, Hwang, Kjerulff, & Chuang, 2012).

Provider-delivered health promotion in IPNC is associated with women reporting better interpersonal care and healthy behaviors. In a telephone study with 363 black, white, and Latina women enrolled in Medicaid, women's reports of receiving

psychosocial assessment (in the areas of mood, money, food, housing, parenting, and abuse) and health promotion (vitamins, nutrition, weight gain, physical activity, second-hand smoke) contributed to their reporting better interpersonal care (communication, decision-making, interpersonal style) and greater satisfaction (Korenbrot, Wong, & Stewart, 2005). In a cross-sectional quantitative study with 159 medically low-risk black and Mexican-American women in their third trimester of pregnancy, women reported they wanted or needed to discuss using seatbelts, dealing with stress, family planning, and caring for their baby but did not; they reported receiving information on several topics where they did not want or need information, including supplements, eating specific food groups, drinking water, and stopping substance use (Vonderheid, Montgomery, & Norr, 2003). The number of health promotion topics varied substantially at the individual level, and receiving more health promotion messages was associated with improved health behaviors (Vonderheid, Norr, & Handler, 2007).

Taken in sum, this literature suggests women have preferences regarding IPNC provider relationships and content, but that the traditional IPNC model does not always offer care consistent with these preferences. Nearly all studies rely on cross-sectional interviews or surveys and many were limited to specific demographic groups, or specific functions or topics, thus do not address women's experiences with PNC comprehensively over the course of pregnancy, nor the psychosocial effects of these experiences.

Women's experiences with GPNC

Several qualitative studies conducted in the US and Canada, including two focus-group studies and three studies using individual interviews, describe women's GPNC experiences. One study involving five focus groups (N=33) identified four key aspects of

GPNC: respect and open communication with providers, knowledge gains, mutual support with other group members, and becoming a better mother (Herrman, Rogers, & Ehrenthal, 2012). Whether study participants were currently pregnant or postpartum for the focus groups was unclear. Thirteen of the study participants did not receive GPNC, and the findings do not distinguish if or how these perspectives are included in the findings, making an assessment of the methodology and findings difficult. Risisky and colleagues conducted three focus groups with a purposive sample of ten women, most of whom were first-time mothers, who had participated in GPNC and given birth at least three months prior to the focus group; two spouses and one mother of a participant also participated (Risisky, Asghar, Chaffee, & DeGennaro, 2013). Women described their GPNC experience in terms of two key aspects, gaining knowledge and sharing the experience. Women also highlighted the importance of developing a close relationship with their facilitator, a midwife who also attended the birth, and the positive effects during pregnancy, labor, and postpartum of having support people participate in GPNC (Risisky, et al., 2013).

Three studies of GPNC experiences involved individual interviews. In a phenomenological qualitative study exploring the core meaning of GPNC, eight Canadian women with different cultural backgrounds and child bearing experiences participated in one-on-one interviews between eight and 14 weeks postpartum; five women (including one who also completed an interview) participated in a validation session of the findings (McNeil et al., 2012). The researchers identified that the central meaning of women's GPNC experience is they got more than they realized they needed. Aspects of this core experience included connecting and feeling supported by their

provider and the other women, actively participating in their care, getting more in one place at one time, and learning valuable information (McNeil, et al., 2012). Kennedy and colleagues conducted phone interviews with 234 IPNC and GPNC participants at three months postpartum who had participated in the RCT of GPNC in two military settings to learn what they liked most and least and what they would change about their PNC (Kennedy et al., 2009). The results do not indicate how many interviews were with IPNC vs. GPNC participants. GPNC interviewees spoke at greater length about PNC and valued learning they were not alone in their experiences and enjoyed the feel of community in GPNC, with some raising concerns about limited individual provider time and privacy. IPNC interviewees spoke comparatively less about their PNC, and the reported findings focused on concerns with IPNC, including lack of provider continuity, long waits, short appointments, and unmet needs for information (Kennedy, et al., 2009).

In the one prospective, longitudinal qualitative GPNC study, 21 young, predominantly black women were interviewed; eight women completed three interviews, eight completed two interviews, and five completed one interview (Novick, et al., 2011). These interview results were integrated with provider interviews and participant observation to summarize in depth the activities, interactions, and characteristics of the GPNC experience. Women enjoyed receiving GPNC, became invested in the groups, and felt their providers and other women were also invested in them; GPNC was a collaborative effort, more of a social gathering than a medical appointment, with trusting and caring relationships that still had boundaries (e.g., some women did not bring up particularly difficult life circumstances they were experiencing with the group). Women also described learning valuable information in ways they could understand and apply,

and learning they were not alone in their concerns (Novick, et al., 2011). GPNC also ameliorated multiple life stressors, including partner relationships, low social support, and isolation (Novick, et al., 2011; Novick, Sadler, Knafl, Groce, & Kennedy, 2012).

Across these qualitative studies of the GPNC experience, the researchers identified multiple psychosocial benefits arising from the GPNC experience: feeling supported by their providers and group participants, encouraged they are not alone in their concerns or experiences, motivated to engage in healthy behaviors, and prepared for birth and postpartum (Herrman, et al., 2012; Kennedy, et al., 2009; McNeil, et al., 2012; Novick, et al., 2011; Risisky, et al., 2013). While some qualitative participants contrasted their own GPNC experience with past IPNC experience, these studies as a group do not explicitly compare the GPNC care experience and benefits with the IPNC care experience and benefits. Without an improved understanding of women's experiences of PNC in the context of their lived experiences, which provides a stronger conceptual framework explaining both the mechanisms and outcomes of GPNC, quantitative studies thus far may not be comparing the appropriate psychosocial outcomes across PNC models (Manant & Dodgson, 2011).

2.6 Conceptual Framework

The original theoretical basis for the CP model of GPNC drew on several frameworks: feminist theory, the midwifery model of care, social support theory, and self-efficacy theory (Rising, et al., 2004). With research to date supporting the positive effects of GPNC on pregnancy outcomes and the lack of effects of GPNC on social support networks and self-efficacy, I developed a revised conceptual model of GPNC based on the stress, coping, and pregnancy outcomes literature (Figure 2.1).

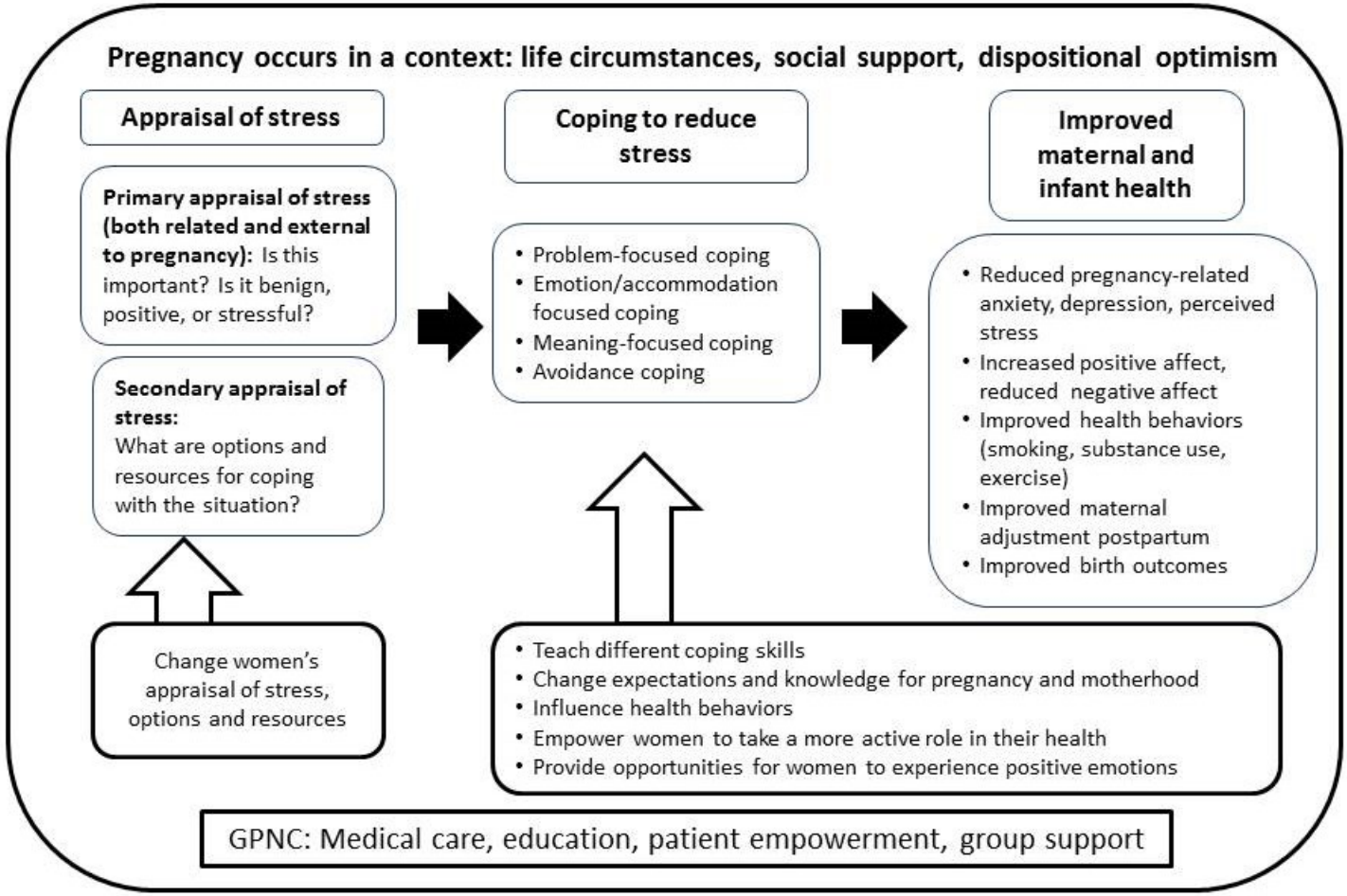

Figure 2.1 Group Prenatal Care Conceptual Framework

In sum, GPNC decreases women's appraisals of pregnancy as stressful, broadens women's appraisals of their coping resources and strategies, and increases positive emotional states, leading to improved psychosocial well-being and birth outcomes.

For many women, pregnancy is a stressful period of transition and change. Stress arises when one appraises one's relationship with the environment as straining or exceeding one's resources and threatening one's well-being (Lazarus & Folkman, 1984). Essentially, stress is the gap between what one wants and the current situation (Smith & Kirby, 2010). Appraisal involves two processes: evaluating a particular situation for its relevance and whether it is benign, positive, or stressful, and assessing one's resources and strategies for coping and their likelihood of success (Lazarus & Folkman, 1984).

Coping regulates the problems causing stress and the effects of stress. People use many different coping strategies, depending on their appraisal of the situation and its controllability, dispositional traits, particularly optimism, and the social resources they have available (Folkman & Moskowitz, 2000). People change their coping strategies as they re-evaluate the situation and their resources (Lazarus & Folkman, 1984). Problem-focused coping strategies involve addressing the underlying problem, emotional-focused coping strategies involve changing emotional reactions, and meaning-based coping strategies involve drawing on values or beliefs to find meaning, particularly in situations of chronic stress. Avoidance tactics are also coping strategies, usually associated with worse outcomes (Folkman & Moskowitz, 2004).

People experience both negative and positive emotional states during stressful life periods. Both are significant in the coping process. Negative affect prompts people to focus on the stressful situation and motivates action. Experiences of positive emotions

can give people a break from stress, and can broaden their focus and behaviors, supporting an increase in resources and physiological resilience and prevention of depression. Positive reappraisal, problem-focused coping, and finding positive meaning are coping mechanisms related to positive affect (Folkman & Moskowitz, 2000).

In GPNC, education, group support, and patient empowerment provide multiple avenues to affect how women appraise and cope with their life circumstances and their pregnancy. Changes in appraisal and coping are hypothesized to improve maternal health through reduced stress, anxiety, and depression and improved affect and functioning, and the health of the baby through reduced prematurity and low birth weight.

2.7 Research Study Rationale

IPNC is one of the most common healthcare interventions, yet it has not reduced the prevalence of premature or low birth weight babies. GPNC is a promising intervention that requires large, well-controlled RCTs with thorough process evaluation to conclusively establish its effectiveness (Vonderheid, et al., 2011). Before investing in RCTs to predict outcomes, building a better understanding of GPNC effects from women's perspectives and through theory-driven, reliable measurement of outcomes should occur (Manant & Dodgson, 2011). Pregnancy is a significant life transition, stressful for many women (Dunkel Schetter, 2011). PNC providers interact with women frequently, and the changing needs and experiences of women with PNC are not well understood.

This study addressed several shortcomings in the GPNC literature. First, this study aimed to maximize the probability of detecting improvements in psychosocial outcomes through using a wider range of valid, reliable measurement scales and through

recruiting an adequately powered study sample. Second, the outcomes were derived from a theory-driven conceptual model tied to the field's current understanding of psychosocial factors' influence on birth outcomes and postpartum maternal adjustment. Third, analyses assessed for the heterogeneity of treatment effects through comparing GPNC and IPNC participants in subgroups based on prenatal distress, low social support, parity, and race. Lastly, the concurrent qualitative interviews provided rich data on how the two models of PNC affect women's lives on an ongoing basis, allowing for a critical appraisal of the psychosocial outcomes hypothesized in the conceptual model and quantitative study and the possible identification of different, salient processes and outcomes for further research.

CHAPTER 3: RESEARCH DESIGN AND METHODS

3.1 Overview of Research Design

We used a convergent parallel mixed-methods design for this comparative effectiveness study of GPNC vs. IPNC (Creswell & Plano Clark, 2011). The primary goal of using a convergent design in this research was to build a broader, detailed understanding of GPNC effects compared to IPNC. Aim 1 of this research study was to test the hypothesis that GPNC (vs. IPNC) participants demonstrate significantly greater positive psychosocial outcomes in their third trimester of pregnancy and at 6 weeks postpartum. To address this aim, surveys conducted at study enrollment, in late pregnancy, and at six weeks postpartum assessed psychosocial constructs to compare the effects of each PNC model.

Aim 2 of this research study was to develop an in-depth understanding of the meanings and effects women attribute to PNC on their well-being and health and their babies' health throughout pregnancy and into the early postpartum period, in the context of their pregnancies and life experiences. Qualitative methods are particularly suited to explore patients' views on the important features and quality of their healthcare services which are difficult to uncover through quantitative methods (Pope, van Royen, & Baker, 2002). Serial qualitative interviewing confers several advantages over qualitative interviews or focus groups conducted at a single point. Through building an ongoing, trusting relationship with participants, serial interviews offer the opportunity to explore

participants' changing needs and experiences, discuss sensitive topics, and understand how external factors affect these experiences (Murray et al., 2009). Comparative studies, through both their design and analysis techniques, can be very valuable in discerning different themes and a range of dimensions and properties related to these themes (Corbin & Strauss, 2008). Therefore, to address Aim 2, frequent, brief interviews were conducted with women during pregnancy through six weeks postpartum using semi-structured interview guides.

Table 3.1 summarizes the data collection and analysis plans for each aim. Table 3.2 provides an overview of how the data collection procedures aligned with women's gestational age and prenatal care appointments. Both the quantitative and qualitative studies received concurrent IRB approval from the Greenville Health System and the University of South Carolina.

Table 3.1 Summary of Study Aims and Research Design

Aim	1. Examine differences in psychosocial outcomes for GPNC vs. IPNC	2. Develop an in-depth understanding of the meanings and effects women attribute to PNC
Data collection	Surveys: early & late pregnancy, 6 weeks postpartum	Interviews: through pregnancy and early postpartum
Data elements	Self-reported scales: pregnancy anxiety, perceived stress, depression, prenatal coping, positive and negative affect	Women's descriptions of how PNC affects actions, opinions & feelings; women's descriptions of worries, stress, and how they manage
Data preparation and exploration	Data screening, recoding, descriptive analyses, factor analyses, imputation for missing data	Transcription, transcript review, writing memos, developing preliminary codes and themes
Data analysis	Multiple regression using difference scores for longitudinal outcomes and scale scores for outcomes measured at one time point; moderator analysis to assess heterogeneity of treatment effects for subgroups	Coding interviews, developing and summarizing themes & relationships, data displays and matrices
Interpretation & validation of results	Comparison of results with prior literature	
	Quantitative validity: analyses of scale reliability, participant attrition, regression diagnostics, alternate model specifications	
	Qualitative validity: peer debriefing, ongoing review of matrices, memos, conceptual models, and coding, triangulation of sources by PNC model and parity using theme matrices	
Integration of results	Comparison of quantitative and qualitative results on PNC effects	
	Identification of emergent themes related to PNC functions and effects not in quantitative results	
	Refinement of GPNC conceptual framework	

Table 3.2 Prenatal Care and Data Collection Timeline

Gestational Age	Prenatal Care Visit	Quantitative Data Collection	Qualitative Data Collection
8-16 weeks	• Nursing intake, labs, ultrasound • Initial PNC appointment with nurse practitioner/ nurse midwife	Eligibility screening for study participation	
12-16 weeks	• Women select GPNC or IPNC • Screening and ultrasound • First GPNC meeting	Informed consent Survey 1	
16-20 weeks	GPNC/IPNC visit 2		Recruitment calls
21-24 weeks	GPNC/IPNC visit 3		Informed consent and Interview 1 (in person)
25-28 weeks	GPNC/IPNC visit 4		Phone interview
29-30 weeks	GPNC/IPNC visit 5		Phone interview
31-32 weeks	GPNC/IPNC visit 6		
33-34 weeks	GPNC/IPNC visit 7	Survey 2	Phone interview
35-36 weeks	GPNC/IPNC visit 8		
37-38 weeks	GPNC/IPNC visit 9		Phone interview
39-40 weeks	GPNC/IPNC visit 10		
3 weeks postpartum			Phone interview
6 weeks postpartum	Postpartum checkup	Survey 3	Final interview

3.2 Research Methods for Aim 1

Eligibility, Recruitment, and Data Collection

All English-speaking women entering prenatal care before their 16th week with medically low risk pregnancies were eligible to participate in the study, following the practice's existing eligibility criteria for participation in GPNC. Medically high-risk women, including those with pre-gestational hypertension or diabetes, multiple gestation, women with a body mass index greater than 40, or planned cervical cerclage were ineligible. During each eligible woman's first PNC visit, the provider explained her choice for IPNC or GPNC and briefly introduced the study. Women who agreed to be contacted for study participation were called before their next scheduled visit to GHS, either a PNC appointment or an ultrasound, to explain the study procedures; GHS research nurses met with women who decided to participate to complete the consent form and the initial survey during this next visit. Consent from a parent or guardian was also obtained for women under 18. Study recruitment ran from June 2012 to December 2012; the final postpartum survey was received in September 2013.

Using the parameters of an 80% retention rate in GPNC based on 2012 clinic data and 80% power to detect an effect size of 0.40 in psychosocial outcomes, we determined the targeted sample size to be 100 in each group. About 50% of eligible women (N=248) consented to the study and completed survey 1; 124 GPNC and 124 IPNC participants were recruited for the study. Women were considered to be in the GPNC cohort if they attended one or more group sessions, and women were retained in the study if they switched to IPNC (N=30, 25% of GPNC participants).

Women received reminder calls for survey 2 in advance of their scheduled IPNC appointment or GPNC session at 30-34 weeks' gestation. Women also received reminder calls for survey 3 in advance of their postpartum checkup. Women usually completed the surveys while they waited for their IPNC appointments or after a GPNC meeting. Women who did not attend their postpartum appointments were offered the opportunity to complete survey 3 by mail; 23 participants completed survey 3 by mail.

Two-hundred twenty women (89%) completed survey 2, and 209 women (84%) completed survey 3. Women primarily did not complete survey 2 because they left the practice (57%, 16 women). Seven women (25% of those not completing survey 2) had their babies before completing survey 2, and 11% (3 women) had a miscarriage. Two women who gave their babies up for adoption were excluded from analyses. Women who did not complete survey 3 did not attend their postpartum checkup at the practice and could not be reached to complete the survey by mail. Women received a $10 gift card from a local department store for the first survey, a $15 gift card for the second survey, and a $20 gift card for the third survey. Mean gestational age at survey 1 was 12.5 weeks (SD 2.1 weeks) and at survey 2 was 32.7 weeks (SD 1.2). The mean weeks' postpartum for survey 3 was 6.8 (SD 3.1 weeks).

All participants were assigned a study number when they completed the informed consent process. Reminder call and survey completion information for all participants was stored in an Excel spreadsheet on a secure GHS server. All survey data was entered into a de-identified Excel spreadsheet using participant study numbers. A student intern completed half of the survey 1 data entry and I completed all other data entry; all data entry was reviewed for accuracy. Medical chart data was collected by the GHS

CenteringPregnancy Coordinator or me using a standardized form, and 20% of abstracted records were randomly selected for accuracy checks. We entered medical chart data into a password protected Excel spreadsheet which was stored on a secure GHS server to protect personal health information.

Measures

Guided by the conceptual model (Figure 2.1), the study used reliable and valid scales to assess psychosocial outcomes, women's characteristics and life circumstances, and perceptions of PNC. The scales were ordered and formatted to minimize participant burden (Dillman, 2000) and the initial survey was pretested with several GPNC participants. Table 3.3 summarizes the scales. The surveys are included in the Appendix.

Table 3.3 Summary of Measures by Survey

Survey 1 (12-16 weeks)	**Psychosocial outcomes:** Perceived stress (PSS), depressive symptoms (CES-D), pregnancy distress (PDQ), prenatal coping (R-PCI), positive & negative affect (PANAS) **Women's characteristics/life circumstances:** social support (MSSS), dispositional optimism (LOT-R), life stressors, demographics
Survey 2 (30-34 weeks)	**Psychosocial outcomes:** Perceived stress (PSS), depressive symptoms (CES-D), pregnancy distress (PDQ), prenatal coping (R-PCI), positive & negative affect (PANAS), pregnancy related empowerment **Women's characteristics/life circumstances:** social support (MSSS), dispositional optimism (LOT-R), life stressors
Survey 3 (6 weeks postpartum)	**Psychosocial outcomes:** Perceived stress (PSS), depressive symptoms (CES-D), positive & negative affect (PANAS), maternal functioning (BIMF), maternal postnatal attachment (MPA) **Women's characteristics/life circumstances:** social support (MSSS), dispositional optimism (LOT-R), life stressors

Psychosocial outcomes

The **Perceived Stress Scale (PSS)** is a widely used, reliable, and valid measure of appraisals of general stress, with 10 items assessing how overloading and uncontrollable people find their life circumstances (Cohen & Janicki-Deverts, 2012; Cohen & Williamson, 1988); each item is scored from 0 (never) to 4 (very often). Versions of the PSS have been used in other studies with pregnant women (Ickovics, et al., 2011; Lobel et al., 2008). In this study, Cronbach's alpha at survey 1 including all participants was 0.79. The **Center for Epidemiological Studies Depression Scale (CES-D)** is a widely used assessment of depressive symptoms with demonstrated validity and reliability (Radloff, 1977), and is frequently used in studies involving pregnant women (Borders, Grobman, Amsden, & Holl, 2007; Dole et al., 2004; Ickovics, et al., 2011). Respondents indicate how often in the past week they experienced each symptom (less than one day to 5-7 days). Five of the 20 items representing a somatic factor were eliminated because of overlap with pregnancy symptoms (e.g., restless sleep, appetite changes). Cronbach's alpha at survey 1 for all participants was 0.87. In the **Positive and Negative Affect Schedule (PANAS)**, respondents indicate how often they have felt each of 20 feelings or emotions in the past week using a five-point scale (very slightly or not at all to extremely). The positive and negative affect subscales have shown internal consistency and are largely uncorrelated. The PANAS has demonstrated discriminant and convergent validity (Watson, Clark, & Tellegen, 1988) and has been used in other studies involving stress reduction interventions during pregnancy (Urizar, et al., 2004; Vieten & Astin, 2008). At survey 1 for all participants, Cronbach's alpha was 0.88 for both positive and negative affect. Participants completed the PSS, CES-D, and PANAS in all three surveys.

Participants completed the **Prenatal Distress Questionnaire (PDQ)** and the **Revised Prenatal Coping Inventory (R-PCI)** in surveys 1 and 2. The PDQ assesses how worried or bothered women are currently (not at all, somewhat, or very much) about 17 common worries and stressors during pregnancy, for example, concerns about labor and delivery, paying for the baby's expenses, and managing work, relationships, and childcare (Lobel, 1996). Increased prenatal distress is associated with negative health behaviors and birth outcomes (Lobel, Cannella, et al., 2008). Cronbach's alpha at survey 1 for all participants was 0.87. The R-PCI includes items adapted from established coping scales and additional items developed through focus groups and pilot testing with pregnant women (Hamilton & Lobel, 2008). Respondents indicate how often on a five-point scale (never to very often) in the last month they used each strategy to manage the challenges of being pregnant. Two factors utilizing items identified through exploratory factor analysis and previously published studies (Hamilton & Lobel, 2008) were used in this study: planning-preparation (15 items) and avoidance (11 items). At survey 1 for all participants, Cronbach's alpha was 0.88 for planning-preparation coping and 0.81 for avoidance coping.

Nine items were used from the **Pregnancy-Related Empowerment Scale (PRE)** (Klima, 2005), completed at survey 2, to assess women's engagement in their health care and in making their pregnancy healthy. Respondents indicate their level of agreement on a four-point scale with statements related to responsibility for healthcare decisions, health behaviors, and help-seeking. The development process included an expert panel review and pilot testing with pregnant women (C. Klima, personal communication, October 19, 2011). Cronbach's alpha for all participants at survey 2 was 0.88.

Maternal functioning and maternal postnatal attachment were assessed in the postpartum survey. On the **Barkin Index of Maternal Functioning (BIMF)** (Barkin et al., 2010), respondents indicate on a seven-point scale their level of agreement with 20 statements covering different functional areas, including self-care, infant care, mother-child interaction, psychological well-being, social support, management, and adjustment. Developed from focus groups with mothers, an extensive literature review, and an expert panel review, the BIMF has been used in clinical settings and demonstrated internal consistency and construct validity (Barkin, et al., 2010). Exploratory factor analysis supported a one-factor solution; Cronbach's alpha for all participants completing survey 3 was 0.85. The **Maternal Postnatal Attachment (MPA)** scale (Condon & Corkindale, 1998) includes 19 items covering topics relating to quality of attachment, pleasure in interaction, and absence of hostility. Questions have different response sets but are calibrated to a five-point scale to assure equal weighting (J. Condon, personal communication, January 7, 2013). The scale has demonstrated internal consistency, test-retest reliability, and construct validity (Condon & Corkindale, 1998; Mason, Briggs, & Silver, 2011). Exploratory factor analysis supported a one-factor solution, and Cronbach's alpha for all participants completing survey 3 was 0.72. All psychosocial outcome scales were summed and treated as continuous variables in analyses.

Demographic characteristics and life circumstances

On survey 1, women reported their age, race, Hispanic ethnicity, number of children, educational level, household income, whether their pregnancy was planned, and their initial feelings about their pregnancy (very or somewhat happy, not sure, very or somewhat unhappy). Perceived social support was measured with the **Maternity Social**

Support Scale (MSSS), six items assessing perceived support from friends, family, and husband/partner. Developed for clinical settings with pregnant women, scores have been correlated with worse health in pregnancy, late entry into PNC, postpartum depression, and health-related quality of life (Webster et al., 2000; Webster, Nicholas, Velacott, Cridland, & Fawcett, 2011). The six MSSS items from survey 1 were summed and used as a continuous variable in some analyses. Using score ranges provided by the scale authors, participants were also categorized as having low support (scores of 0-18 points), medium support (19-24 points), or adequate support (25-30 points), then grouped into adequate or less than adequate (e.g. low or medium) support for some analyses.

Dispositional optimism was measured with the **Life Orientation Test – Revised (LOT-R)**. Six items assess the degree to which people have positive expectancies for their future, and the scale has demonstrated acceptable internal consistency and construct validity (Scheier, Carver, & Bridges, 1994). Optimists use different coping patterns and have improved health and well-being (Carver, Scheier, & Segerstrom, 2010). The six LOT-R items from survey 1 were summed and used as a continuous variable in analyses.

Women reported on 14 life stressors experienced in the year prior to pregnancy and since becoming pregnant (survey 1), in the last three months (survey 2), and postpartum (survey 3). Stressors were adapted from the Pregnancy Risk Assessment Monitoring System and included moving, homelessness, separation or divorce, family illness, job loss, arguing with partner/spouse more than usual, partner/spouse not wanting pregnancy, bills that could not be paid, in a physical fight, incarceration of participant or partner/spouse, someone close to participant had alcohol or drug use issues, and death of someone close to participant (Centers for Disease Control and Prevention, 2011). In

survey 1, women were asked if each of these events occurred during the past year or since becoming pregnant. Events were summed for each time period. In surveys 2 and 3, women were asked if each event occurred, then were asked if the event was not stressful, somewhat stressful, or very stressful. Variables summing the number of somewhat or very stressful events were created for each time period. At survey 2, 28% of participants had zero events, 23% had one event, 21% had two events, and 28% had more than two somewhat or very stressful events in the last three months, and a dichotomous variable was created indicating whether each participant had two or more stressful events in the last three months. For survey 3, 48% had zero events, 20% had one event, 15% had two events, and 17% had more than two somewhat or very stressful events since having their baby (approximately a six week time period). A dichotomous variable was created indicating whether participants had one or more stressful life events since having their baby.

Women also completed five questions related to food insecurity (Blumberg, Bialostosky, Hamilton, & Briefel, 1999), and five questions on intimate partner violence (Centers for Disease Control and Prevention, 2011; McFarlane, Parker, Soeken, & Bullock, 1992) on each survey. Food insecurity was dichotomized into a variable indicating whether women were food secure (answered none or one question affirmatively), or food insecure (answered two to five questions affirmatively). Affirmative responses to the intimate partner violence questions for survey 2 (covering the last three months) or survey 3 (covering the postpartum period) were summed, then dichotomized to indicate whether women affirmed one or more questions. A dichotomous

variable indicating whether women affirmed one or more questions in either survey 2 or survey 3 was also generated for use in some postpartum analyses.

Prenatal care participation and birth outcomes

Medical records review provided the frequency and type of prenatal care visits, gestational age, birth weight, pregnancy complications (e.g., gestational diabetes), history of preterm birth, mode of delivery (Caesarean section or vaginal), marital status, and participation in Nurse-Family Partnership services (nursing home visitation services for at-risk first-time mothers). NFP nurses visit low-income first-time mothers from pregnancy until the infant is two years, helping women improve their prenatal health, parenting, and parental life course (e.g., planning future pregnancies, finishing education, finding employment) (Olds, 2006). NFP content overlaps with PNC education.

Imputation for missing data

Across time points, between 1% and 7% of outcome scales had one or more items missing (predominantly, scales were missing one or two items, with no discernable patterns), and 0% to 4% of covariates. Scale items were imputed using regression methods with the other scale items as covariates. Scales with no completed items (e.g., participant skipped the scale or did not complete the survey) were not imputed. Categorical variables were imputed using a hotdeck procedure, stratified by race, education, and parity (Schonlau, 2006). Table 3.4 summarizes the number of cases with imputed scale items and categorical variables.

Table 3.4 Summary of Imputed Cases by Scale, Variable and Data Source

	Data source			
Scale or categorical variable	Survey 1 (N=248)	Survey 2 (N=221)	Survey 3 (N=209)	Chart review
Prenatal distress (PDQ)	6	6		
Planning-preparation coping (R-PCI)	12	8		
Avoidance coping (R-PCI)	14	7		
Depression symptoms (CES-D)	9	10	13	
Positive affect (PANAS)	15	15	9	
Negative affect (PANAS)	14	2	10	
Perceived stress (PSS)	3	10	4	
Life orientation (LOT-R)	8			
Pregnancy empowerment		13		
Maternal functioning (BMFI)			4	
Postnatal maternal attachment (MPA)			10	
Marital status				40
Income	10			
Planned pregnancy	2			
Initial feelings about pregnancy	3			

Analysis

Two-tailed independent sample t-tests for continuous variables and χ^2 tests for categorical variables tested differences between IPNC and GPNC participants at survey 1. For outcomes measured at more than one time point, difference scores were calculated for each time interval. Bivariate comparisons of the GPNC and IPNC difference scores and outcome scores (for outcomes measured at survey 2 or 3 only) were compared using two-tailed independent sample t-tests.

Multiple regression models tested whether GPNC participants had significantly greater improvements in outcomes (i.e., difference scores) or attained better outcomes (for outcomes assessed at survey 2 or 3 only) compared to IPNC. For outcomes at late pregnancy, analyses adjusted for demographics, survey 1 social support, life optimism,

pregnancy intendedness, life stressors in pregnancy, pregnancy risk factors (previous preterm birth and gestational diabetes diagnosis), and Nurse-Family Partnership participation. For postpartum outcomes, multiple regression models adjusted for survey 1 social support, life optimism, pregnancy intendedness, life stressors experienced postpartum, adequacy of prenatal care, and Nurse-Family Partnership participation. All analyses were done as intent-to-treat, with secondary analyses comparing women who were retained in their initial group assignment (i.e., did not switch from GPNC to IPNC, combined N=188). Multiple regression models of difference scores did not separately include the survey 1 score as a covariate in order to produce unbiased estimates of group effects (Fitzmaurice, Laird, & Ware, 2004).

A planned set of moderator analyses tested hypotheses that GPNC may have different effects for women who entered the study at greater psychosocial risk (i.e., with less than adequate social support using a score of 24 or less (Webster, et al., 2000), and highest tertile prenatal distress (Lobel, Cannella, et al., 2008)), for black women (Ickovics, et al., 2007), or for primiparous women. Interaction terms (group assignment x moderator) were included separately in the multiple regression models for each outcome and planned linear contrasts tested group assignment for each of two levels of the moderator. All analyses were conducted using Stata version 12 (StataCorp LP, 2011).

For the final models, we assessed for outliers and data points with high leverage; checked the distribution of residuals for normality, linearity, and for heteroskedasticity; and assessed potential multicollinearity. For sensitivity analyses, we ran models: without outliers and potential high-leverage points, excluding women who dropped out of GPNC,

and with alternative specifications for covariates. Each analysis was run on cases with complete data, then including imputed data.

3.2 Research Methods for Aim 2

Eligibility, Recruitment, and Data Collection

During the informed consent process for the quantitative study, women indicated whether an investigator could contact them about the qualitative study. I selected participants for recruitment telephone calls based on age, race, parity, and survey 1 reported stress levels to assure a heterogeneous sample (Patton, 2002). The interviewer called the potential qualitative participant prior to her next PNC appointment to introduce the study. If the woman was interested, the interviewer scheduled the written informed-consent process and initial face-to-face interview to coincide with the woman's next prenatal care appointment or GPNC session. Women were eligible for recruitment if the initial interview could be scheduled between approximately 16 and 25 weeks gestation.

Women participated in one face-to-face interview (mean gestational age 21.9 weeks), followed by up to four brief monthly phone interviews during pregnancy (Frongillo, Valois, & Wolfe, 2003; Murray, et al., 2009). A brief phone interview at three weeks postpartum and a 20-30 minute interview six weeks postpartum (either face-to-face or by phone, based on each woman's preference) were also completed (Novick, 2008). Five final interviews were conducted in person, and 20 were conducted by telephone. Women received gift cards in recognition of their time spent during the interviews; $20.00 for completing the initial face-to-face interview, $5.00 for each monthly phone interview during pregnancy, $10.00 for the first postpartum phone interview, and $10.00 for the final interview.

With the exception of one participant who had a different interviewer at her final interview, participants spoke with the same interviewer throughout. Fifteen GPNC and 14 IPNC participants were recruited. I interviewed 19 participants (11 GPNC participants and eight IPNC participants), Dr. Deborah Billings interviewed six participants (four GPNC participants and two IPNC participants), and Sarah Covington-Kolb, the GHS CenteringPregnancy Coordinator, interviewed four IPNC participants. Four participants left the study in their second or third trimester. One IPNC participant dropped out after the initial interview because she moved, two IPNC participants dropped out after their first phone interviews, and one GPNC participant dropped out after her initial interview. We conducted 42 second trimester, 48 third trimester, and 44 postpartum interviews. All interviews were recorded and transcribed. To assure the transcription process was high quality, I compared approximately half of the transcriptions to the audio files.

Interview Guides

Interviewers used semi-structured interview guides to assure a systematic approach to each interview while permitting the interviewer to adopt a conversational style and further explore particular themes with participants (Patton, 2002). In the initial interview, women were asked about their families, important relationships, housing arrangements, employment, how their pregnancy was going, aspects of their lives that were causing stress, and how they managed their stress. In the initial interview and each pregnancy interview, women were asked to describe their most recent prenatal appointment or group; its effects on their feelings, opinions, behavior, health, relationships, and future plans; and the most meaningful or important part of the appointment or group to them. Women also were asked to describe their relationship with

their group leader (GPNC) or provider (IPNC). In the postpartum interviews, women were asked to describe how PNC had helped them prepare for what they experienced in labor, delivery, and the immediate postpartum period; how PNC was affecting their postpartum health, their parenting, and their relationship with their partner; and the most important or meaningful part of their PNC overall.

I adapted the interview guides at two points during the data collection phase to modify questions that were not clear to participants or were not effective in eliciting detailed responses from participants, and to add questions to better probe for themes that were emerging in other interviews. I discussed revisions and elicited reviews of the revised guides from the other interviewers. The final interview guides are included in the Appendix.

Analysis

Grounded theory guided the data collection and analysis. Grounded theory is a methodology for building theory from empirical data (Corbin & Strauss, 2008). Corbin (2008) describes qualitative researchers as interpreters of people's words and actions; our underlying assumption in this study was women could describe their PNC experiences and connect these experiences with their emotions, behaviors, decisions, and plans, and the role of analysis was to translate and communicate these experiences. As the first interviews were completed, transcribed, and analyzed, I identified preliminary themes. I used constant comparisons extensively, an analytic tool of comparing each new instance of a theme to other instances already coded to that theme, to differentiate themes and to identify different dimensions or properties of each theme (Corbin & Strauss, 2008). These themes were tested and modified through coding subsequent interviews and by

writing theme and summary memos. Emerging themes were explored in further interviews or with different participants. Matrices, coding summaries, and case summaries were created to facilitate the drawing and verification of conclusions (Miles & Huberman, 1994). Throughout data collection and analysis, I engaged with members of the research team in peer debriefing and ongoing review of matrices, memos, conceptual models, and coding to assure validity. I developed matrices comparing themes across PNC model and by parity as a strategy for triangulating multiple sources. The serial interviewing structure provided an opportunity for member checking of themes from earlier interviews. In the final stages of analysis, I integrated the themes describing the core functions of the two PNC models into a core category, resulting in an explanatory framework of women's experiences with PNC (Corbin & Strauss, 2008). All analyses were completed using NVivo 10 software (QSR International Pty Ltd., 2012).

CHAPTER 4: RESULTS

This chapter presents the results of this study in two manuscripts. Manuscript 1 was prepared for submission to the journal Archives of Women's Mental Health. The aim of Manuscript 1 was to test the hypothesis that GPNC (vs. IPNC) participants demonstrate significantly greater positive psychosocial outcomes in their third trimester of pregnancy and at six weeks postpartum. Manuscript 2 was prepared for submission to the journal Social Science and Medicine. The aim of Manuscript 2 was to develop an in-depth understanding of the meanings and effects women attribute to PNC on their well-being and health and their babies' health throughout pregnancy and into the early postpartum period, in the context of their pregnancies and life experiences.

4.1 The Comparative Effects of Group Prenatal Care on Maternal Stress and Coping[1]

[1] Heberlein, E.C., Picklesimer, A.H., Billings, D.L., Covington-Kolb, S., Farber, N., and Frongillo, E.A. To be submitted to *Archives of Women's Mental Health.*

Abstract

The purpose of this study is to compare the psychosocial outcomes of the CenteringPregnancy model of group prenatal care (GPNC) to individual prenatal care (IPNC). Using a quasi-experimental study design, 124 IPNC and 124 GPNC participants completed surveys at study recruitment (mean gestational age 12.5 weeks); 89% completed a second survey in late pregnancy, and 84% completed a third survey at 6 weeks' postpartum. In multiple regression analyses, GPNC participants did not demonstrate significantly greater positive psychosocial outcomes at either time point. Among women with inadequate initial social support, GPNC participants demonstrated a 3.16 point greater decrease (p=0.034) in prenatal distress in late pregnancy and a 5.22 point greater decrease (p=.009) in their postpartum negative affect scores. Among women with high initial prenatal distress, GPNC participants had a 7.96 point greater increase (p=.008) in planning and preparation coping in late pregnancy and a 6.04 point greater decrease (p=.013) in postpartum depressive symptom scores. Analyses with imputed data demonstrated the same patterns but the magnitudes of the differences were attenuated. Women who were at greater psychosocial risk benefitted from participation in GPNC. Large randomized studies are needed to establish conclusively the biological and psychosocial benefits of GPNC for women.

Introduction

High rates of preterm birth and low birth weight, with considerable racial disparities, continue in the United States despite increases in the early initiation and frequency of prenatal care (PNC) visits in the last several decades (Alexander & Kotelchuck, 2001; Krans & Davis, 2012; Martin, Hamilton, & Ventura, 2012). While the etiology of birth outcomes is complex, psychosocial factors including stress, anxiety, depression, and social support are critical contributing factors (Behrman & Butler, 2007; Dunkel Schetter, 2011) and also affect infant and child development and maternal functioning postpartum (Lobel, Hamilton, et al., 2008). The prevailing model of individual prenatal care (IPNC) provides important medical assessment and treatment but offers limited counseling and health behavior education to address women's individual psychosocial needs (Krans & Davis, 2012; Novick, 2009; Vonderheid, et al., 2003).

The CenteringPregnancy model of group prenatal care (GPNC), where individual prenatal health care is bundled with group education and support, is an alternative PNC model that has demonstrated better birth outcomes (Ickovics, et al., 2007; Ickovics, et al., 2003; Picklesimer, et al., 2012; Tandon, et al., 2012; Tanner-Smith, Steinka-Fry, & Lipsey, 2013) and improvements in some psychosocial outcomes among women entering care with high stress levels (Ickovics, et al., 2011). Improved patient engagement and health behaviors and reduced stress are theorized to be important GPNC secondary outcomes and mechanisms affecting birth outcomes, although research has not substantiated improved health behaviors (Robertson, et al., 2009; Shakespear, Waite, & Gast, 2010) or improved psychosocial outcomes including stress, self-esteem, social support, locus of control, or reduced depression on average among GPNC participants

compared to IPNC participants (Baldwin, 2006; Ickovics, et al., 2011; Kennedy, et al., 2011; Robertson, et al., 2009). These studies have compared a limited range of psychosocial outcomes, often in small samples and homogenous study populations, without examining differential effects for women with greater need for support and education (e.g., with higher stress levels, or first-time mothers). Further formal evaluation with particular attention to theoretically driven outcomes measurement is needed (Manant & Dodgson, 2011; Sheeder, et al., 2012) to inform policy makers and healthcare providers weighing the challenges and benefits of implementing GPNC.

Pregnancy is a stressful period of transition and change for many women (Dunkel Schetter, 2011). People feel stress when they appraise a situation as straining or exceeding their resources (Lazarus & Folkman, 1984). To regulate the causes and effects of stress, people use different coping strategies, influenced by their perceptions, dispositional traits (e.g., optimism), and their social resources (Folkman & Moskowitz, 2000, 2004; Lazarus & Folkman, 1984). This framework of stress and coping is particularly salient for comparing the psychosocial effects of GPNC to IPNC. GPNC may more effectively than IPNC decrease women's appraisals of pregnancy, birth and the early postpartum period as stressful and broaden women's coping resources, leading to improved psychosocial well-being. Women with inadequate social support, high pregnancy-related distress, first-time mothers, or historically disenfranchised racial groups may experience greater benefits from GPNC.

Our study therefore addresses two research questions: Do GPNC participants demonstrate significantly better psychosocial outcomes in late pregnancy and early postpartum compared to IPNC participants? Do women with low social support, high

pregnancy-related distress, black women, or primiparous women experience greater positive psychosocial outcomes in GPNC compared to IPNC? This conceptually driven range of outcomes has not been studied in a diverse population adequately powered to detect differences in psychosocial measures.

Methods

Research Design

The study employed a quasi-experimental, non-equivalent comparison group design. IPNC and GPNC participants completed surveys at study recruitment (first or early second trimester of pregnancy), third trimester of pregnancy, and at six weeks' postpartum. Changes in psychosocial outcomes for women selecting GPNC were compared to women selecting IPNC.

Study Setting

This study was conducted at a large PNC provider in the southeastern United States, serving over 2,500 pregnant women annually. The clinic's population is racially diverse, low-income, and primarily Medicaid-eligible. Since 2009, women with medically low-risk pregnancies have had the choice of either GPNC or IPNC. Certified nurse midwives or nurse practitioners provide both models of prenatal care. Since February 2010, the Centering Healthcare Institute has certified that the site provides consistent, high-quality GPNC according to the CenteringPregnancy model. We received approval from the Institutional Review Board from the practice's hospital and the University of South Carolina.

Participants and Procedures

All English-speaking women entering prenatal care before their 16th week with medically low risk pregnancies were eligible to participate in the study, following the practice's existing eligibility criteria for participation in GPNC. Medically high-risk women, including those with pre-gestational hypertension or diabetes, multiple gestation, women with a body mass index greater than 40, or planned cervical cerclage were ineligible. During each eligible woman's first PNC visit, the provider explained her choice for IPNC or GPNC and briefly introduced the study. Women who decided to participate in the study signed the consent form and completed the initial survey during their next visit to the clinic. Consent from a parent or guardian was also obtained for women under 18. Study recruitment ran from June 2012 to December 2012; the final postpartum survey was received in September 2013.

Using the parameters of an 80% retention rate in GPNC based on current clinic data and 80% power to detect an effect size of 0.40 in psychosocial outcomes, we determined the targeted sample size to be 100 in each group. One hundred twenty four women in each group consented to the study and completed survey 1 (N=248). Women were considered to be in the GPNC cohort if they attended one or more group sessions, and GPNC women continued to participate in the study if they switched to IPNC (N=30, 25% of GPNC participants). Two-hundred twenty women (89%) completed survey 2, and 209 women (84%) completed survey 3. Women primarily did not complete survey 2 because they left the practice (57%, 16 women). Seven women (25% of those not completing survey 2) had their babies before completing survey 2, and three women (11%) had a miscarriage. Two women who gave their babies up for adoption were

excluded from analyses. Women did not complete survey 3 because they did not attend their postpartum checkup at the practice and could not be reached to complete the survey by mail.

Women received a $10 gift card from a local department store for completing the first survey, a $15 gift card for the second survey, and a $20 gift card for the third survey. Mean gestational age at survey 1 was 12.5 weeks (SD 2.1 weeks) and at survey 2 was 32.7 weeks (SD 1.2). The mean weeks' postpartum for survey 3 was 6.8 (SD 3.1 weeks).

Individual Prenatal Care

IPNC for women with uncomplicated pregnancies involves monthly provider visits for the first 28 weeks of pregnancy, every two to three weeks until 36 weeks, then weekly until birth. Visits include an initial medical and psychosocial history, followed by ongoing medical assessment and patient education. Women receive routine screenings as well as specialized tests, interventions, and referrals depending on risk factors and the course of pregnancy (American Academy of Pediatrics & American College of Obstetricians and Gynecologists, 2007). IPNC visits are usually short (15-20 minutes). At the study site, nurse practitioners and certified nurse midwives provide anticipatory guidance and patient education following clinical practice guidelines and as patient needs arise.

Group Prenatal Care

In the CenteringPregnancy model, GPNC is provided in ten 2-hour group sessions with eight to twelve women with due dates in the same 4-6 week range. Providers assess each woman's medical and psychosocial history, and perform the same ongoing medical assessment as IPNC, with women measuring and recording their own blood pressure and

weight. The groups then focus on issues related to pregnancy, childbirth, and parenting, providing for expanded opportunity for the education and support components of prenatal care (Rising, et al., 2004). The topics include nutrition, exercise, relaxation techniques, pregnancy problems and comfort measures, infant care and feeding, communication, self-esteem, healthy relationships, parenting, and preparation for childbirth (Massey, et al., 2006). Based on individual assessment and issues arising during groups, medical and psychosocial interventions are provided as needed. GPNC provides an opportunity for women to increase their social support, change norms on health behaviors, and share information with one another. Significant others/partners are included in the sessions at the study site, although some groups at other sites may establish different norms.

Measures

Psychosocial outcomes

The **Perceived Stress Scale (PSS)** is a widely used, reliable, and valid measure of appraisals of general stress, with 10 items assessing how overloading and uncontrollable people find their life circumstances (Cohen & Janicki-Deverts, 2012; Cohen & Williamson, 1988); each item is scored from 0 (never) to 4 (very often). Versions of the PSS have been used in other studies with pregnant women (Ickovics, et al., 2011; Lobel, Cannella, et al., 2008). In this study, Cronbach's alpha at survey 1 including all participants was 0.79. The **Center for Epidemiological Studies Depression Scale (CES-D)** is a widely used assessment of depressive symptoms with demonstrated validity and reliability (Radloff, 1977), and is frequently used in studies involving pregnant women (Borders, et al., 2007; Dole, et al., 2004; Ickovics, et al., 2011). Respondents indicate how often in the past week they experienced each symptom (less than one day to

5-7 days). Five of the 20 items representing a somatic factor were eliminated because of overlap with pregnancy symptoms (e.g., restless sleep, appetite changes). Cronbach's alpha at survey 1 for all participants was 0.87. In the **Positive and Negative Affect Schedule (PANAS)**, respondents indicate how often they have felt each of 20 feelings or emotions in the past week using a five-point scale (very slightly or not at all to extremely). The positive and negative affect subscales have shown internal consistency and are largely uncorrelated. The PANAS has demonstrated discriminant and convergent validity (Watson, et al., 1988) and has been used in other studies involving stress reduction interventions during pregnancy (Urizar, et al., 2004; Vieten & Astin, 2008). At survey 1 for all participants, Cronbach's alpha was 0.88 for both positive and negative affect. Participants completed the PSS, CES-D, and PANAS in all three surveys.

Participants completed the **Prenatal Distress Questionnaire (PDQ)** and the **Revised Prenatal Coping Inventory (R-PCI)** in surveys 1 and 2. The PDQ assesses how worried or bothered women are currently (not at all, somewhat, or very much) about 17 common worries and stressors during pregnancy, for example, concerns about labor and delivery, paying for the baby's expenses, and managing work, relationships, and childcare (Lobel, 1996). Increased prenatal distress is associated with negative health behaviors and birth outcomes (Lobel, Cannella, et al., 2008). Cronbach's alpha at survey 1 for all participants was 0.87. The R-PCI includes items adapted from established coping scales and additional items developed through focus groups and pilot testing with pregnant women (Hamilton & Lobel, 2008). Respondents indicate how often on a five-point scale (never to very often) in the last month they used each strategy to manage the challenges of being pregnant. Two factors utilizing items identified through exploratory

factor analysis and previously published studies (Hamilton & Lobel, 2008) were used in this study: planning-preparation (15 items) and avoidance (11 items). At survey 1 for all participants, Cronbach's alpha was 0.88 for planning-preparation coping and 0.81 for avoidance coping.

Nine items were used from the **Pregnancy-Related Empowerment Scale** (Klima, 2005), completed at survey 2, to assess women's engagement in their health care and in making their pregnancy healthy. Respondents indicate their level of agreement on a four-point scale with statements related to responsibility for healthcare decisions, health behaviors, and help-seeking. The development process included an expert panel review and pilot testing with pregnant women (C. Klima, personal communication, October 19, 2011). Cronbach's alpha for all participants at survey 2 was 0.88.

Maternal functioning and maternal postnatal attachment were assessed in the postpartum survey. On the **Barkin Index of Maternal Functioning (BIMF)** (Barkin, et al., 2010), respondents indicate on a seven-point scale their level of agreement with 20 statements covering different functional areas, including self-care, infant care, mother-child interaction, psychological well-being, social support, management, and adjustment. Developed from focus groups with mothers, an extensive literature review, and an expert panel review, the BIMF has been used in clinical settings and demonstrated internal consistency and construct validity (Barkin, et al., 2010). Exploratory factor analysis supported a one-factor solution; Cronbach's alpha for all participants completing survey 3 was 0.85. The **Maternal Postnatal Attachment (MPA)** scale (Condon & Corkindale, 1998) includes 19 items covering topics relating to quality of attachment, pleasure in interaction, and absence of hostility. Questions have different response sets but are

calibrated to a five-point scale to assure equal weighting (J. Condon, personal communication, January 7, 2013). The scale has demonstrated internal consistency, test-retest reliability, and construct validity (Condon & Corkindale, 1998; Mason, et al., 2011). Exploratory factor analysis supported a one-factor solution, and Cronbach's alpha for all participants completing survey 3 was 0.72.

Demographic characteristics and life circumstances

On survey 1, women reported their age, race, ethnicity, number of children, educational level, income, whether their pregnancy was planned, and their initial feelings about their pregnancy (very or somewhat happy, not sure, very or somewhat unhappy). Perceived social support was measured at survey 1 with the **Maternity Social Support Scale (MSSS)**, six items assessing perceived support from friends, family, and husband/partner. Developed for clinical settings with pregnant women, scores have been correlated with worse health in pregnancy, late entry into PNC, postpartum depression, and health-related quality of life (Webster, et al., 2000; Webster, et al., 2011). Dispositional optimism was measured at survey 1 with the **Life Orientation Test – Revised (LOT-R)**. Six items assess the degree to which people have positive expectancies for their future, and the scale has demonstrated acceptable internal consistency and construct validity (Scheier, et al., 1994). Optimists use different coping patterns and have improved health and well-being (Carver, et al., 2010).

Women reported life stressors experienced in the year prior to pregnancy (survey 1), during pregnancy (survey 2), and postpartum (survey 3). Stressors included 14 life stressors (e.g., moved, homelessness, divorce, family death or illness), adapted from the Pregnancy Risk Assessment Monitoring System (Centers for Disease Control and

Prevention, 2011), five questions related to food insecurity (Blumberg, et al., 1999), and five questions on intimate partner violence (Centers for Disease Control and Prevention, 2011; McFarlane, et al., 1992).

Prenatal care participation and birth outcomes

Medical records review provided the frequency and type of prenatal care visits, gestational age, birth weight, pregnancy complications (e.g., gestational diabetes), history of preterm birth, marital status, and participation in Nurse-Family Partnership (NFP) services. NFP nurses visit low-income first-time mothers from pregnancy until the infant is two years, helping women improve their prenatal health, parenting, and parental life course (e.g., planning future pregnancies, finishing education, finding employment) (Olds, 2006). NFP content overlaps with PNC education.

Statistical Analysis

Two-tailed independent sample t-tests for continuous variables and χ^2 tests for categorical variables tested differences between IPNC and GPNC participants at survey 1. For outcomes measured at more than one time point, difference scores were calculated for each time interval. Bivariate comparisons of the GPNC and IPNC difference scores and outcome scores (for outcomes measured at survey 2 or 3 only) were compared using two-tailed independent sample t-tests. Considering all time points, between 1% and 7% of outcome scales had one or more items missing (predominantly, scales were missing one or two items, with no discernable patterns), and 0% to 4% of covariates. Scale items were imputed using regression methods with the other scale items as covariates. Categorical variables were imputed using a hotdeck procedure, stratified by race, education, and parity (Schonlau, 2006).

Multiple regression models tested whether GPNC participants had significantly greater improvements in outcomes (i.e., difference scores) or attained better outcomes (for outcomes assessed at survey 2 or 3 only) compared to IPNC. For outcomes at late pregnancy, analyses adjusted for demographics, survey 1 social support, life optimism, pregnancy intendedness, life stressors in pregnancy, pregnancy risk factors (previous preterm birth and gestational diabetes diagnosis), and Nurse-Family Partnership participation. For postpartum outcomes, multiple regression models adjusted for survey 1 social support, life optimism, pregnancy intendedness, life stressors experienced postpartum, adequacy of prenatal care, and Nurse-Family Partnership participation. All analyses were done as intent-to-treat, with secondary analyses comparing women who were retained in their initial group assignment (i.e., did not switch from GPNC to IPNC, combined N=188). Multiple regression models of difference scores did not separately include the survey 1 score as a covariate in order to produce unbiased estimates of group effects (Fitzmaurice, et al., 2004).

A planned set of moderator analyses tested hypotheses that GPNC may have different effects for women who entered the study at greater psychosocial risk (i.e., with less than adequate social support using a score of 24 or less (Webster, et al., 2000), and highest tertile prenatal distress (Lobel, Cannella, et al., 2008)), for black women (Ickovics, et al., 2007), or for primiparous women. Interaction terms (group assignment x moderator) were included separately in the multiple regression models for each outcome and planned linear contrasts tested group assignment for each of two levels of the moderator. All analyses were conducted using Stata version 12 (StataCorp LP, 2011).

For the final models, we assessed for outliers and data points with high leverage; checked the distribution of residuals for normality, linearity, and for heteroskedasticity; and assessed potential multicollinearity. For sensitivity analyses, we ran models: without outliers and potential high-leverage points, excluding women who dropped out of GPNC, and with alternative specifications for covariates. Each analysis was run on cases with complete data, and then with imputed data. Simulations were done to confirm that the imputations were done accurately. Descriptive and bivariate analyses were essentially identical for the complete cases and the complete plus imputed cases. Results for multiple regression models are presented for both complete cases and complete plus imputed cases. Analyses excluding women who dropped out of GPNC (N=30) for complete cases and imputed data demonstrated similar or greater benefits for GPNC participants as the intent-to-treat analyses.

Results

Sample characteristics at survey 1

For the GPNC (N=117) and IPNC (N=101) study participants who completed surveys 1 and 2, a higher proportion of GPNC study participants did not have other children (61% vs. 37% for IPNC, $p<0.01$). GNPC study participants were younger (23.5 years vs. 25.4 years for IPNC, $p=0.006$), and had engaged in more planning-preparation coping strategies in the month prior to survey 1 (31.5 vs. 28.2 points, $p=0.051$, Table 4.1). There was also a trend for GPNC study participants to have experienced higher intimate partner violence (15% vs. 8% for IPNC, $p=.090$) and pregnancy-related distress (12.3 points vs. 10.6 points for IPNC, $p=.084$). The two groups were statistically equivalent on all other demographic, life stressor, and survey 1 psychosocial measures.

Table 4.1 Demographic Characteristics, Life Stressors, and Survey 1 Psychosocial Measures for Participants Completing Surveys 1 and 2

Demographic characteristics		**IPNC**	**GPNC**	**p-value**
Race	Black	39%	48%	0.17
	White	61%	52%	
No other children		37%	61%	<0.001
Married		18%	18%	0.999
Education	Less than high school	22%	24%	0.805
	High school diploma	65%	66%	
	Associate's degree or higher	13%	10%	
Income	< $10,000	43%	41%	0.569
	10k-14.9k	12%	19%	
	15k-19.9k	13%	15%	
	20k-24.9k	14%	9%	
	25k and over	17%	16%	
Age at recruitment (mean ± SD)		25.4 (4.9)	23.5 (4.9)	0.006
Life stressors				
Mean count of life stressors (mean ± SD)		3.1 (2.4)	3.2 (2.2)	0.604
Food Security	Food secure	49%	58%	0.341
	Moderately food secure	21%	15%	
	Food insecure	31%	27%	
Trying to get pregnant (yes)		27%	26%	0.884
First feelings about pregnancy	Somewhat or very unhappy	16%	18%	0.508
	Not sure	34%	27%	
	Somewhat or very happy	50%	55%	
Intimate partner violence in past year		8%	15%	0.09
Intimate partner violence since pregnant		7%	14%	0.106
Survey 1 psychosocial measures				
Prenatal distress (mean ± SD)		10.6 (6.8)	12.3 (6.9)	0.084
Highest tertile prenatal distress		30%	41%	0.098
Maternal social support (mean ± SD)		25.2 (4.5)	24.9 (4.9)	0.534
Less than adequate social support		35%	38%	0.645
Perceived stress (mean ± SD)		17.7 (6.2)	18.1 (6.4)	0.671
Depressive symptoms (mean ± SD)		11.8 (7.6)	12.6 (8.9)	0.446
Life orientation (optimism) (mean ± SD)		14.7 (5.1)	15.1 (4.8)	0.579
Planning-preparation coping (mean ± SD)		28.2 (11.7)	31.5 (12.4)	0.051
Avoidance coping (mean ± SD)		14.5 (7.6)	15.6 (8.6)	0.338
Positive affect (mean ± SD)		33.6 (8.3)	34.0 (8.1)	0.742
Negative affect (mean ± SD)		22.8 (8.3)	23.9 (9.0)	0.413
Total number of participants		101	117	

These equivalencies across treatment groups persisted for women who completed survey 3 (N=209, not shown).

Bivariate analyses of outcomes by PNC model

In bivariate comparisons of difference scores and outcome scores in the third trimester and postpartum, GPNC participants experienced a greater decrease in the scores for negative affect (6.47 point decrease compared to 3.86 points decrease for IPNC, t=2.48, p=0.017, Table 4.2). No other group differences were detected in the bivariate analyses for either time period.

Multiple regression analyses of outcomes by PNC model

Among the covariates used in multiple regression analyses that were measured at the second or third survey, GPNC participants were less likely to be food insecure in late pregnancy (17% vs. 34% for IPNC, p=0.004) and less likely to have had a prior preterm birth (5% vs. 14% for IPNC, p=0.034). GPNC participants were more likely to receive Nurse-Family Partnership services (14% vs. 3%, p=0.007), and had approximately one less week between completing surveys 1 and 2 (19.9 weeks vs. 20.7 weeks for IPNC, p=0.022) (Table 4.3).

In the multiple regression models comparing difference scores for GPNC participants to IPNC participants, GPNC participants did not demonstrate significantly greater improvement in prenatal distress, planning-preparation coping, or avoidance coping in pregnancy, or in perceived stress, positive or negative affect, or depressive symptoms in either time period. GPNC participants also did not demonstrate significantly greater pregnancy-related empowerment in late pregnancy, or maternal functioning or maternal-infant interaction postpartum.

Table 4.2 Bivariate Comparisons by PNC Model of Mean Difference Scores (SD) and Mean Outcome (SD) Scores

	Time 2 - Time 1			Time 3 - Time 1		
	IPNC	GPNC	p-value*	IPNC	GPNC	p-value*
Difference scores (outcomes measured at two or three time points)						
Prenatal distress	-1.81 (5.8)	-2.38 (5.5)	0.478			
Planning-preparation coping	2.05 (10.8)	4.09 (9.9)	0.166			
Avoidance coping	-1.21 (7.4)	-0.99 (6.9)	0.830			
Perceived stress	-2.13 (5.9)	-2.08 (6.4)	0.957	-5.66 (7.2)	-6.19 (7.1)	0.605
Positive affect	1.15 (6.7)	1.26 (6.7)	0.902	4.77 (8.4)	5.78 (7.7)	0.412
Negative affect	-1.98 (6.3)	-1.36 (8.1)	0.549	-3.86 (6.6)	-6.47 (7.6)	0.017
Depressive symptoms	-2.48 (6.3)	-2.34 (7.2)	0.882	-3.85 (7.6)	-5.94 (8.7)	0.085
Outcome scores (outcomes measured at one time point)						
	Time 2			Time 3		
	IPNC	GPNC		IPNC	GPNC	
Prenatal empowerment	21.81 (4.0)	22.01 (3.6)	0.712			
Postpartum maternal functioning				103.4 (12.8)	104.33 (10.8)	0.596
Maternal-infant interaction				87.75 (6.3)	88.8 (5.3)	0.213
** Two tailed independent sample t-tests*						

Table 4.3 Comparison of Covariates Measured in Late Pregnancy or Postpartum by Treatment Group

Covariate		Definition	IPNC	GPNC	p-value*
Count of life stressors	Third trimester	Two or more (out of 14) life events experienced in pregnancy and identified as somewhat or very stressful	46%	51%	0.398
	Postpartum	One or more (out of 14) life events experienced since baby's birth and identified somewhat or very stressful	47%	56%	0.176
Food insecure	Third trimester	Two or more affirmative answers out of five questions referring to the prior month	***34%***	***17%***	***0.004***
	Postpartum	Two or more affirmative answers out of five questions referring to the prior month	22%	13%	0.075
Intimate partner violence	Third trimester	Answered yes to one of five questions on IPV occurrence in last 3 months	6%	3%	0.309
	Postpartum	Answered yes to one of five questions in either survey 2 (last 3 months) or survey 3 (postpartum)	6%	9%	0.604
Inadequate prenatal care		Calculated using the Adequacy of Prenatal Care Utilization (APNCU) Index (Kotelchuck, 1994)	7%	6%	0.789
Participation in Nurse-Family Partnership		Home visitation services for at-risk first time mothers; some content and support will overlap with GPNC.	***3%***	***14%***	***0.007***
Pregnancy and birth characteristics		Prior preterm birth	***14%***	***5%***	***0.034***
		Diagnosis of gestational diabetes	7%	2%	0.084
Survey timing		Weeks between survey 1 and 2 (mean ± SD)	***20.7 (2.4)***	***19.9 (2.5)***	***0.022***
		Weeks between birth and survey 3 (mean ± SD)	6.8 (2.2)	6.7 (2.7)	0.805
* based on two-tailed independent t-tests for continuous variables, $\chi 2$ or Fisher's exact tests for categorical variables.					

GPNC women with inadequate social support or high prenatal distress at survey 1 experienced greater improvements in several outcomes in late pregnancy and postpartum. In the complete case analysis, GPNC women with inadequate social support demonstrated a 3.16 point greater decrease (p=0.034) in prenatal distress compared to IPNC women with inadequate social support. These GPNC participants entered the study with greater mean prenatal distress (Table 4.4, Figure 4.1). GPNC women with high prenatal distress had a 7.96 point greater increase (p=.008) in planning and preparation coping, compared to IPNC women with high stress (Table 4.4, Figure 4.2). Postpartum, GPNC women with high survey 1 prenatal distress demonstrated a 6.04 point greater decrease (p=.013) in their depressive symptom scores compared to high-stress IPNC women (Table 4.5, Figure 4.3). GPNC women with inadequate survey 1 social support demonstrated a 5.22 point greater decrease (p=.009) in their negative affect scores compared to IPNC women with low support (Table 4.5, Figure 4.4). Among black women and among primiparous women, no differences in outcomes by PNC model were detected.

The pattern of differences was maintained in analyses with the imputed data, but the magnitudes of the differences were attenuated (Tables 4.4 and 4.5). For the depression analyses, the mean difference score for imputed cases was 50% lower than the mean difference score for complete cases; imputed cases had mean difference scores 14% lower and 24% lower than complete cases in prenatal distress and planning preparation coping analyses, respectively.

Table 4.4 GPNC vs. IPNC Effects on Psychosocial Outcomes in Pregnancy for Women with Survey 1 Inadequate Social Support or High Prenatal Distress

Analysis Type	Analysis N	Moderator Category	GPNC mean±SD (survey 1)	IPNC mean±SD (survey 1)	GPNC adjusted mean difference	IPNC adjusted mean difference	Contrast	p>|t|
Prenatal distress (PDQ)								
Complete cases	182	Inadequate social support	15.25 (6.1)	12.33 (6.6)	***-3.95***	***-0.79***	***-3.16***	***0.034***
		Adequate social support	10.25 (6.8)	9.78 (6.9)	-1.23	-2.23	0.99	0.413
Complete + imputed cases	209	Inadequate social support	15.24 (5.9)	12.36 (6.4)	-3.12	-0.90	-2.22	0.11
		Adequate social support	10.35 (6.8)	9.79 (6.9)	-1.62	-2.14	0.53	0.636
Planning- preparation coping (R-PCI)								
Complete cases	172	Highest tertile distress	33.11 (12.0)	30.63 (9.0)	***5.49***	***-2.47***	***7.96***	***0.008***
		Lower two tertiles distress	30.03 (12.6)	27.58 (12.3)	3.99	3.81	0.23	0.933
Complete + imputed cases	209	Highest tertile distress	33.54 (11.9)	30.37 (8.6)	***3.89***	***-2.52***	***6.4***	***0.017***
		Lower two tertiles distress	30.27 (11.9)	27.7 (12.2)	4.56	4.27	0.29	0.88

Table 4.5. GPNC vs. IPNC Effects on Postpartum Psychosocial Outcomes for Women with Survey 1 Inadequate Social Support or High Prenatal Distress

Analysis Type	Analysis N	Moderator Category	GPNC mean±SD (survey 1)	IPNC mean±SD (survey 1)	GPNC adjusted mean difference	IPNC adjusted mean difference	Contrast	p>|t|
Negative affect (PANAS)								
Complete cases	159	Inadequate social support	29.59 (9.9)	25.07 (7.8)	***-9.58***	***-4.36***	***-5.22***	***0.009***
		Adequate social support	20.93 (6.8)	20.58 (7.1)	-4.24	-3.73	-0.51	0.736
Complete + imputed cases	195	Inadequate social support	28.79 (10.2)	26.10 (8.4)	***-8.74***	***-5.24***	***-3.51***	***0.043***
		Adequate social support	20.79 (6.8)	20.95 (7.4)	-4.51	-3.56	-0.95	0.466
Depressive symptoms (CES-D)								
Complete cases	164	Highest tertile distress	18.32 (9.4)	15.59 (7.7)	***-7.23***	***-1.19***	***-6.04***	***0.013***
		Lower two tertiles distress	8.65 (5.8)	9.59 (6.2)	-4.56	-5.5	0.95	0.549
Complete + imputed cases	195	Highest tertile distress	17.98 (9.3)	15.94 (7.5)	***-6.34***	***-1.99***	***-4.34***	***0.050***
		Lower two tertiles distress	8.48 (5.6)	9.66 (6.1)	-4.37	-4.75	0.39	0.789

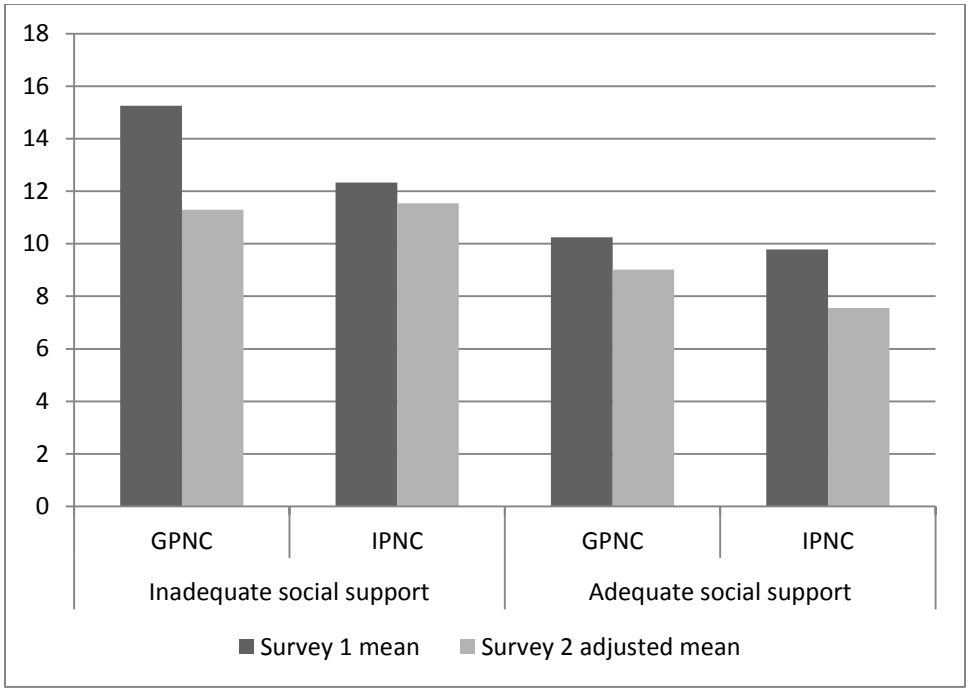

Figure 4.1 Changes in Prenatal Distress by PNC Model and Survey 1 Support Level

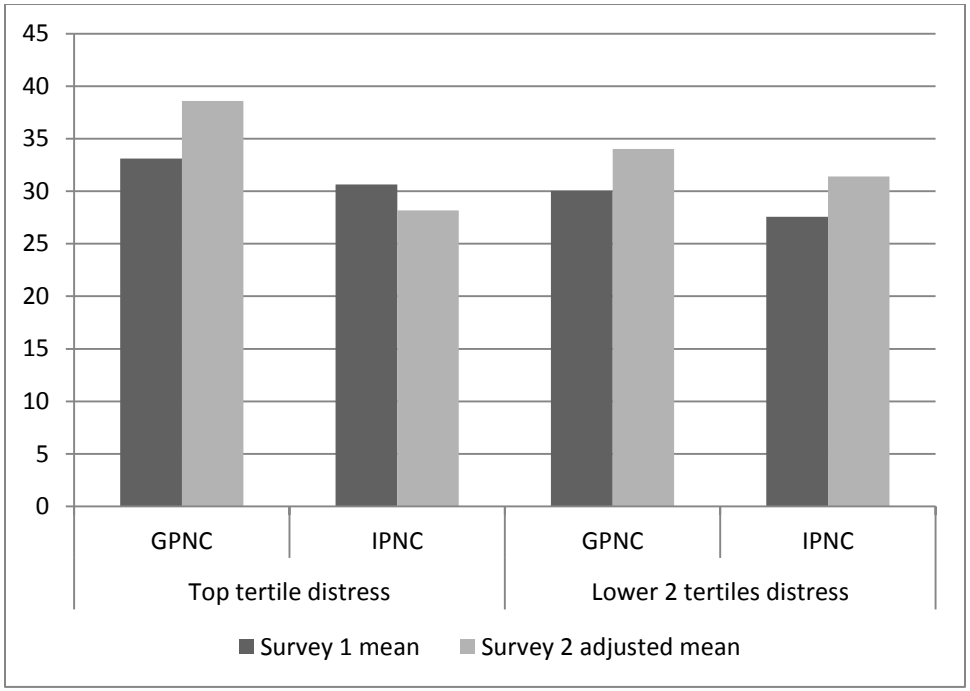

Figure 4.2 Changes in Planning-Preparation Coping by PNC Model and Survey 1 Prenatal Distress Level

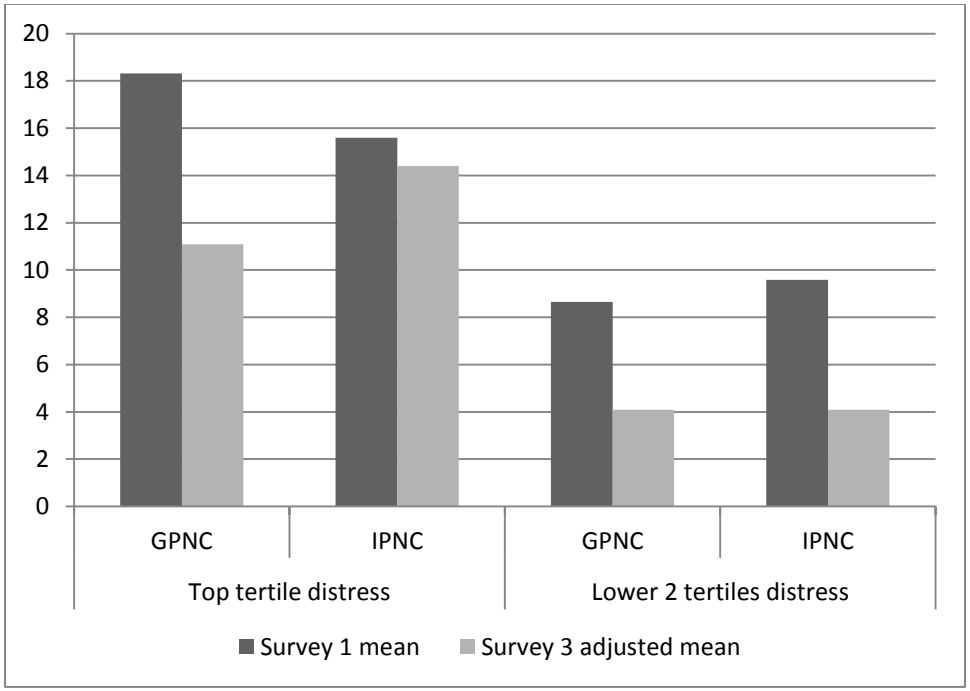

Figure 4.3 Changes in Depression Scores by PNC Model and Survey 1 Prenatal Distress Level

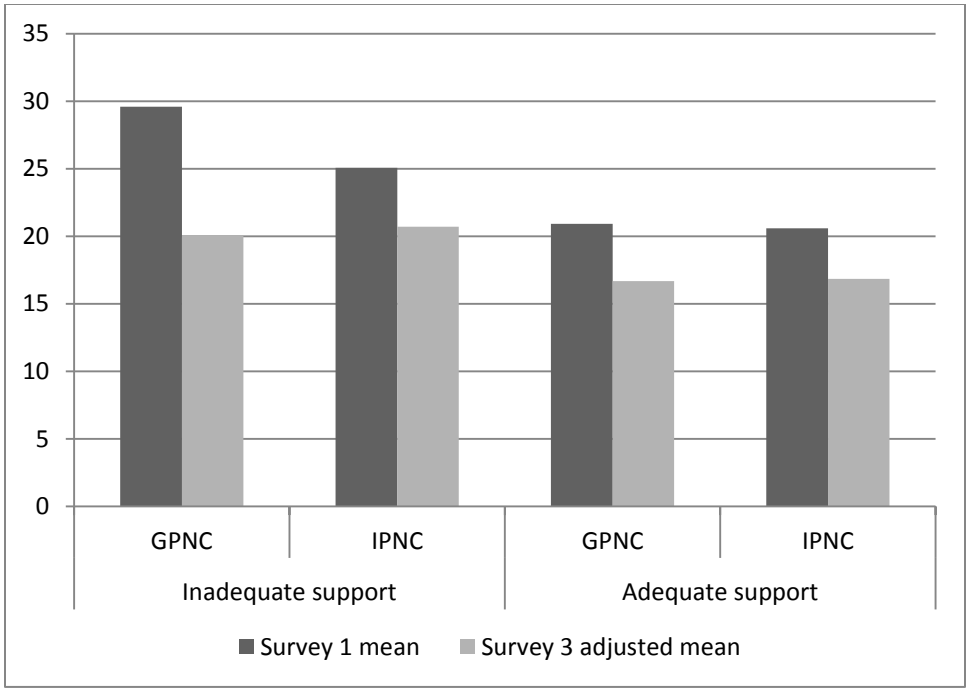

Figure 4.4 Changes in Negative Affect by PNC Model and Survey 1 Support Level

Discussion

While GPNC did not confer psychosocial benefits across all participants, women who were at greater psychosocial risk in areas GPNC specifically addresses – social support and pregnancy-related distress – benefitted from participation in GPNC. While results with a larger sample size generated by imputation showed attenuated effects, the trends were consistent across analyses. Women with inadequate social support used GPNC to ameliorate their higher levels of prenatal distress, resulting in comparable distress levels with their IPNC counterparts. Two other studies did not find overall GPNC effects on prenatal distress (Ickovics, et al., 2007; Kennedy, et al., 2011) but did not report subgroup analyses. As prenatal distress contributes to birth outcomes (Lobel, Cannella, et al., 2008), GPNC effects on women with high levels of prenatal distress require further research.

Coping strategies are central to understanding stress and its effects yet are rarely assessed in intervention studies with pregnant women. GPNC participants with high survey 1 prenatal distress reported increasing their use of planning-preparation strategies, e.g., gaining information, advice, and understanding, while similarly stressed IPNC participants did not. We did not evaluate the effectiveness of these coping strategies on prenatal distress or other possible outcomes including self-efficacy for managing labor or motherhood. Accurately capturing the constantly changing stress appraisal and coping processes and effects is challenging without frequent, intensive measurement (DeLongis & Holtzman, 2005). Our findings do suggest the importance of investigating PNC's impact on expanding coping resources and resulting psychosocial and birth outcomes.

Our study provides some further evidence that at-risk women who participate in GPNC may fare better in the postpartum period as indicated by greater reductions in negative affect and depressive symptoms. These outcomes are particularly important to consider as maternal depression negatively affects parenting quality and health (National Research Council and Institute of Medicine, 2009). Ickovics and colleagues (2011) found a similar reduction in depressive symptoms among women with high perceived stress receiving GPNC. We did not find that GPNC participants, including at-risk subgroups, reported greater maternal-infant attachment or maternal functioning. In both PNC models, women reported high levels of attachment and functioning, suggesting a ceiling effect and perhaps a need for more precise postpartum outcomes measurement.

These results may seem to suggest that practices implementing GPNC consider how to identify women with low social support or high prenatal distress for recruitment into GPNC. The psychosocial benefits of GPNC for women with low psychosocial risk have not been established, and thus it would be premature to consider GPNC an intervention solely appropriate for women reporting particular psychosocial risk factors. Furthermore, GPNC conveys biological as well as psychosocial benefits that must be considered. Building an understanding of the benefits to group members of including women of various needs and backgrounds is critical to unpacking how group processes contribute to the improved psychosocial well-being on some measures for subgroups of women. Practices should focus on facilitating women's initiating and continuing with GPNC through the duration of their pregnancies, rather than in developing particular targeting strategies.

This study has several strengths and limitations. In this quasi-experimental study, we controlled for group differences in analyses but unmeasured group differences may have introduced bias. Potential bias from time-invariant factors was eliminated by the use of longitudinal change scores in some outcomes. Second, our study may have been under-powered to detect differences in at-risk subgroups. Third, most women had five or more GPNC or IPNC visits after completing survey 2 (at a mean gestational age of 32.7 weeks), thus our results from survey 2 may not reflect the extent of the psychosocial benefits women realize from their PNC during pregnancy. Fourth, some of the same nurse practitioners provided both GPNC and IPNC; lack of observed differences by PNC model may reflect practitioners incorporating some educational and supportive aspects of GPNC into IPNC appointments that are not common practice in other IPNC settings. Fifth, although the pattern of differences was maintained in the analyses of the complete plus imputed cases compared to the complete cases, the magnitudes of differences were smaller in the former. We found that the primary reason was that the imputed cases tended to be in the middle of the distributions for outcomes.

This study makes several contributions to the PNC literature and suggests additional research. First, incorporating measures derived from the stress and coping literature, particularly stress, coping, and perceived support measures specifically developed for pregnant women, is useful for evaluating psychosocial outcomes of PNC. Qualitative research exploring PNC influences on stress and coping during pregnancy can provide direction for identifying or creating additional outcome measures to better reflect the experiences of women. Second, this study used a variety of measures to assess stress at multiple points. While individual scales demonstrated high internal reliability, and

were used in analyses as individual measures, overlap amongst scales indicates a need for research to develop concise yet comprehensive measurement of stress in pregnancy that is associated with birth outcomes. This will help in designing better studies and in targeting and comparing the effectiveness across interventions. Third, GPNC may have greater psychosocial effects on at-risk subgroups; evaluating strategies for engaging and retaining at-risk women in GPNC, and analyzing global as well as subgroup treatment effects can offer providers and policy makers better information regarding expected outcomes for GPNC. Larger randomized studies, powered to detect differences in birth outcomes and psychosocial outcomes for at-risk groups, and incorporating process evaluation and additional data collection points, are needed to establish more conclusively GPNC biological and psychosocial outcomes for a range of participants.

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4.2 Women's Perspectives on the Functions of Prenatal Care and the Differential Benefits of Group vs. Individual Prenatal Care[2]

[2] Heberlein, E.C., Picklesimer, A.H., Billings, D.L., Covington-Kolb, S., Farber, N., and Frongillo, E.A. To be submitted to *Social Science and Medicine.*

Abstract

Despite increased access to individual prenatal care (IPNC) in the last several decades, women in the United States still experience high rates of adverse birth outcomes. To improve the effectiveness of PNC, research and health policy efforts must extend beyond addressing PNC access to include PNC content and quality. Group prenatal care (GPNC), combining individual physical assessments and facilitated group education and support, has shown some promising results, including lower preterm birth rates. No research has engaged with women to learn what they describe as the important functions of their routine prenatal care, or how women's experiences of these functions and resulting benefits differ between IPNC and GPNC. We addressed this gap through a prospective, longitudinal, qualitative study with 14 IPNC and 15 GPNC participants of different ages, races, parity, and stress levels. Women participated in one face-to-face interview (mean gestational age 21.9 weeks), up to four brief monthly phone interviews during pregnancy, and two postpartum phone interviews (at three and six weeks), using semi-structured interview guides. Grounded theory guided the data collection and analysis. Women's core experience of PNC is to receive reassurance, guidance, and support in managing their health, their pregnancy, and preparing for birth and motherhood. This core experience encompasses four important functions, confirming health, preventing and monitoring medical complications, educating and preparing, and building supportive relationships. GPNC participants experienced greater benefits in educating and preparing and building supportive relationships. While women want to maximize their chances for having a healthy baby, other outcomes are important for women in PNC: reducing pregnancy-related stress; developing confidence and

knowledge for improving health; readiness for labor, delivery, and infant care; and having supportive relationships. Achieving these other outcomes is particularly relevant in a healthcare system prioritizing patient-centered care and improved birth outcomes and should be part of ongoing policy development and research for women's healthcare.

Introduction and Background

Prenatal care (PNC) provides early and ongoing risk assessment, health promotion, and medical and psychosocial intervention to support the health and wellness of the pregnant woman and the fetus in pregnancy into the first year postpartum (Alexander & Kotelchuck, 2001; United States Public Health Service, 1989). Despite increases in the rates of women entering PNC early and receiving the recommended number of PNC visits, high rates of adverse birth outcomes persist in the United States (Alexander & Kotelchuck, 2001; Fiscella, 1995; Krans & Davis, 2012; Lu, et al., 2003). To improve the effectiveness of PNC, research and health policy efforts must extend beyond addressing PNC access to include PNC content and quality (Krans & Davis, 2012; Vonderheid, et al., 2007).

The traditional model of individual prenatal care (IPNC) in the United States stipulates monthly visits to the healthcare provider through 28 weeks, every two to three weeks until 36 weeks, then weekly until birth. Visits include an initial medical and psychosocial history, ongoing physical assessment, with additional tests, interventions, and referrals as needed, and patient education on pregnancy, prenatal care, labor and delivery, educational programs, breastfeeding, and pediatrician selection (American Academy of Pediatrics & American College of Obstetricians and Gynecologists, 2007). Most IPNC visits are brief (10 to 15 minutes) and focus on identifying medical risks, with

limited opportunity for counseling and support (Novick, 2009) and inconsistent coverage of health promotion topics (e.g., nutrition, smoking, sexual health) (Krans & Davis, 2012; Vonderheid, et al., 2003; Vonderheid, et al., 2007).

Limited research has engaged with women to learn how they describe the functions and benefits of IPNC (Novick, 2009). Some research has identified what women want or perceive the benefits of prenatal care *will be*, including gaining knowledge about the fetus' health, healthy behaviors, and labor and delivery (Blackwell, 2002; Fuller & Gallagher, 1999). Multiple studies have established women's perspectives on the value, characteristics, and benefits of positive patient-provider relationships in IPNC (Bennett, et al., 2006; Blackwell, 2002; Handler, Rosenberg, Raube, & Lyons, 2003; Lori, et al., 2011; Tandon, et al., 2005; Wheatley, et al., 2008), as well as experiences of negative provider interactions (Moore, Ketner, Walsh, & Wagoner, 2004; Sheppard, et al., 2004; Ward, Mazul, Ngui, Bridgewater, & Harley, 2013) and barriers to accessing care (Mikhail & Curry, 1999; Phillippi, 2009). The provision of psychosocial assessment and health promotion contributes to women reporting higher quality interpersonal care (communication, decision-making, interpersonal style) and greater satisfaction (Korenbrot, et al., 2005), and receipt of health promotion messages is associated with improved health behaviors (Vonderheid, et al., 2007). Taken in sum, this literature indicates multiple IPNC functions or characteristics may be beneficial to women, yet research has not provided a comprehensive view of women's care experiences (Novick, 2009) across these functions, in different settings, and over the course of pregnancy.

Group prenatal care (GPNC) has been developed to address limitations of IPNC in meeting women's needs (Rising, 1998; Rising, et al., 2004). The CenteringPregnancy (CP) model of GPNC is provided in ten 2-hour group sessions with eight to twelve women with similar due dates. Providers conduct the same ongoing physical assessment as IPNC in a private area of the group space, and women measure their own blood pressure and weight. Following the individual assessments, the provider facilitates a group discussion, covering issues related to pregnancy, childbirth, and parenting, keeping with a general curriculum while adapting to the needs and interests of the group (Rising, et al., 2004). In a national survey representative of U.S. women ages 18-45 who had a single birth in 2012, about 3% of women usually or always had GPNC for their appointments (Declercq, Sakala, Corry, Applebaum, & Herrlich, 2013).

Several quantitative studies comparing GPNC to IPNC indicate some benefits for GPNC, including improvements in preterm birth (Ickovics, et al., 2007; Picklesimer, et al., 2012; Tandon, et al., 2012), mean gestational age, and mean birth weight (Tanner-Smith, Steinka-Fry, & Lipsey, 2013). Participating in GPNC may reduce the likelihood of excessive gestational weight gain (Tanner-Smith, Steinka-Fry, & Gesell, 2013), and improve some psychosocial outcomes among women experiencing high levels of prenatal stress (Ickovics, et al., 2011). GPNC participants have high levels of satisfaction and may demonstrate greater engagement with healthcare as indicated by higher rates of PNC use, attendance at postpartum checkups, establishment of a medical home for their baby, or use of postpartum family planning services (Hale, et al., 2014; Kennedy, et al., 2011; Tandon, et al., 2013). Several small studies with varying populations comparing patient-reported outcomes of GPNC to IPNC including stress, social support, self-esteem, and

pregnancy-related health behaviors, have found mixed or null effects (Baldwin, 2006; Robertson, et al., 2009; Shakespear, et al., 2010).

While this evidence indicates some positive clinical and utilization outcomes for GPNC, the body of quantitative research does not provide a clear picture of patient perspectives on the critical functions or benefits of GPNC as compared to IPNC. Several qualitative studies conducted in the US and Canada describe women's GPNC experiences; women feel supported by their providers and group participants, encouraged they are not alone in their concerns or experiences, motivated to engage in healthy behaviors, and prepared for birth and postpartum (Herrman, et al., 2012; Kennedy, et al., 2009; McNeil, et al., 2012; Novick, et al., 2011; Risisky, et al., 2013). Retrospective interviews and use of focus groups in several studies potentially limits the detailed exploration of individual experiences and introduces recall bias. The one longitudinal qualitative GPNC study described experiences in the group setting in depth and found GPNC ameliorated multiple life stressors, including partner relationships, low social support, and isolation (Novick, et al., 2011; Novick, et al., 2012). One study also included IPNC participants, although the reported findings were limited to a short discussion of concerns (e.g., lack of provider continuity and wait times), and were specific to a military setting (Kennedy, et al., 2009). While identifying prominent descriptive themes, none of these studies explicitly compared the functions and benefits of GPNC to IPNC.

To address the knowledge gap in women's perspectives on the functions and benefits of the current standard of care (IPNC) and how these compare to GPNC, we conducted a prospective, longitudinal, qualitative study with IPNC and GPNC participants, of different ages, races, parity, and stress levels. This study investigated two

research questions: first, what do women describe as the important functions of their routine prenatal care; second, for each of these functions, how do women's experiences and benefits differ according to the type of PNC they selected (i.e., GPNC vs. IPNC).

Methods

Qualitative methods are particularly suited to explore patients' views on the important features and quality of their healthcare services which are difficult to uncover through quantitative methods (Pope, et al., 2002). Serial qualitative interviewing confers several advantages over qualitative interviews or focus groups conducted at a single point during pregnancy or retrospectively postpartum. Through building an ongoing, trusting relationship with participants, serial interviews offer the opportunity to explore participants' changing needs and experiences, discuss sensitive topics, and understand how external factors affect these experiences (Murray, et al., 2009). Comparative studies, through both their design and analysis techniques, can be very valuable in discerning different themes and a range of dimensions and properties related to these themes (Corbin & Strauss, 2008).

This study, part of a larger mixed-methods study comparing the effectiveness of the CP model of GPNC to IPNC on women's psychosocial health, was conducted at a large practice in the southeastern United States providing prenatal care to a racially diverse and primarily Medicaid-eligible population. Since 2009, women with medically low-risk pregnancies have had the choice of either GPNC or IPNC. Certified nurse midwives or nurse practitioners provide both models of care.

During the informed consent process for the larger quantitative study (N=248), women indicated whether an investigator could contact them about the qualitative study.

The first author selected participants for recruitment telephone calls based on age, race, parity, and baseline reported stress levels to assure a heterogeneous sample (Patton, 2002). The first author or a co-author (DLB or SCK) called the potential qualitative participant prior to her next PNC appointment to introduce the study. If the woman was interested, the investigator scheduled the written informed-consent process and initial face-to-face interview to coincide with the woman's next prenatal care appointment or GPNC session. Women were eligible for recruitment if the initial interview was scheduled between approximately 16 and 25 weeks gestation. Institutional Review Board approval was received from the practice's hospital and the University of South Carolina.

Women participated in one face-to-face interview (mean gestational age 21.9 weeks), followed by up to four brief monthly phone interviews during pregnancy (Frongillo, et al., 2003; Murray, et al., 2009). A brief phone interview at three weeks postpartum and a 20-30 minute interview six weeks postpartum (either face-to-face or on the phone, based on each woman's preference) were also completed (Novick, 2008). All interviews were audio recorded. Women received gift cards in recognition of their time spent during the interviews; $20.00 for completing the initial face-to-face interview, $5.00 for each monthly phone interview during pregnancy, $10.00 for the first postpartum phone interview, and $10.00 for the final interview. With the exception of one participant who had a different interviewer at her final interview, participants spoke with the same interviewer throughout.

Interviewers used semi-structured interview guides to assure a systematic approach to each interview while permitting the interviewer to adopt a conversational style and further explore particular themes with participants (Patton, 2002). In each

pregnancy interview, women were asked to describe their most recent prenatal appointment or group; its effects on their feelings, opinions, behavior, health, relationships, and future plans; and the most meaningful or important part of the appointment or group to them. Women also were asked to describe their relationship with their group leader (GPNC) or provider (IPNC). In the postpartum interviews, women were asked to describe how PNC had helped them prepare for what they experienced in labor, delivery, and the immediate postpartum period; how PNC was affecting their postpartum health, their parenting, and their relationship with their partner; and the most important or meaningful part of their PNC overall. All interviews were transcribed and analyzed using NVivo 10 software.

Grounded theory guided the data collection and analysis. Grounded theory is a methodology for building theory from empirical data (Corbin & Strauss, 2008). Corbin (2008) describes qualitative researchers as interpreters of people's words and actions; our underlying assumption in this study was women could describe their PNC experiences and connect these experiences with their emotions, behaviors, decisions, and plans, and the role of the analyst was to translate and communicate these experiences. As the first interviews were completed, transcribed, and analyzed, the first author identified preliminary themes. These themes were tested and modified through coding subsequent interviews and writing detailed theme and summary memos. Emerging themes were explored in further interviews or with different participants. Matrices and case summaries were created to facilitate the drawing and verification of conclusions (Miles & Huberman, 1994). Throughout data collection and analysis, the first author engaged with members of the research team in peer debriefing and ongoing review of matrices, memos,

conceptual models, and coding to assure validity. The first author developed matrices comparing themes across PNC model and by parity as a strategy for triangulating multiple sources. The serial interviewing structure provided an opportunity for member checking of themes from earlier interviews. In the final stages of analysis, the themes describing the core functions of the two PNC models were integrated into a core category, resulting in an explanatory framework of women's experiences with PNC (Corbin & Strauss, 2008).

Results

Fifteen GPNC and 14 IPNC participants were recruited (Table 4.6); 42 second trimester, 48 third trimester, and 44 postpartum interviews were completed. Four participants (three IPNC, one GPNC) left the study in their second or third trimester.

Table 4.6 Demographics of Qualitative Study Participants

		GPNC (n=15)	**IPNC (n=14)**
Mean age (years)		24.4	26.6
Race	Black	53%	50%
	White	40%	50%
	Latina	7%	0%
No other children		73%	33%
Married		27%	21%
Education	Less than high school diploma	7%	21%
	High school diploma	73%	50%
	Associate's Degree or higher	20%	29%
Annual Household income	< $15,000	47%	50%
	$15,000 - $25,000	33%	36%
	Over $25,000	13%	14%

Women's central experience of prenatal care was to receive reassurance, guidance, and support in managing their health, their pregnancy, and preparing for birth and motherhood. Women described four prenatal care functions contributing to this central experience: confirming baby and mother's health, preventing and monitoring medical complications, educating and preparing, and building supportive relationships. The function about which IPNC participants talked most was confirming health, with secondary emphasis on preventing or monitoring complications and building supportive provider relationships; these participants described few benefits of educating and preparing. Confirming health was also quite important for GPNC participants, but these participants described at length the functions and benefits of educating and preparing and building supportive relationships. Figure 4.5 illustrates the relative importance and benefits of each function by PNC model. The relative sizes of the function boxes represent the relative frequency and depth of women's descriptions of each function; the relative sizes of the arrows represent the relative amount of benefits associated with the different PNC functions. Women's experiences and benefits also varied according to their, needs, social support resources, and prior experiences. Table 4.7 includes quotations illustrating and comparing these functions and effects.

Confirming baby and mother's health

Throughout their pregnancies, both GPNC and IPNC participants described how provider confirmation of their and their baby's health made them feel relieved and reassured. Nearly all women, regardless of PNC model and whether or not it was their first baby, identified reassurance as an important or meaningful part of their care. This focused on hearing the baby's heartbeat, as well as measuring the baby's growth,

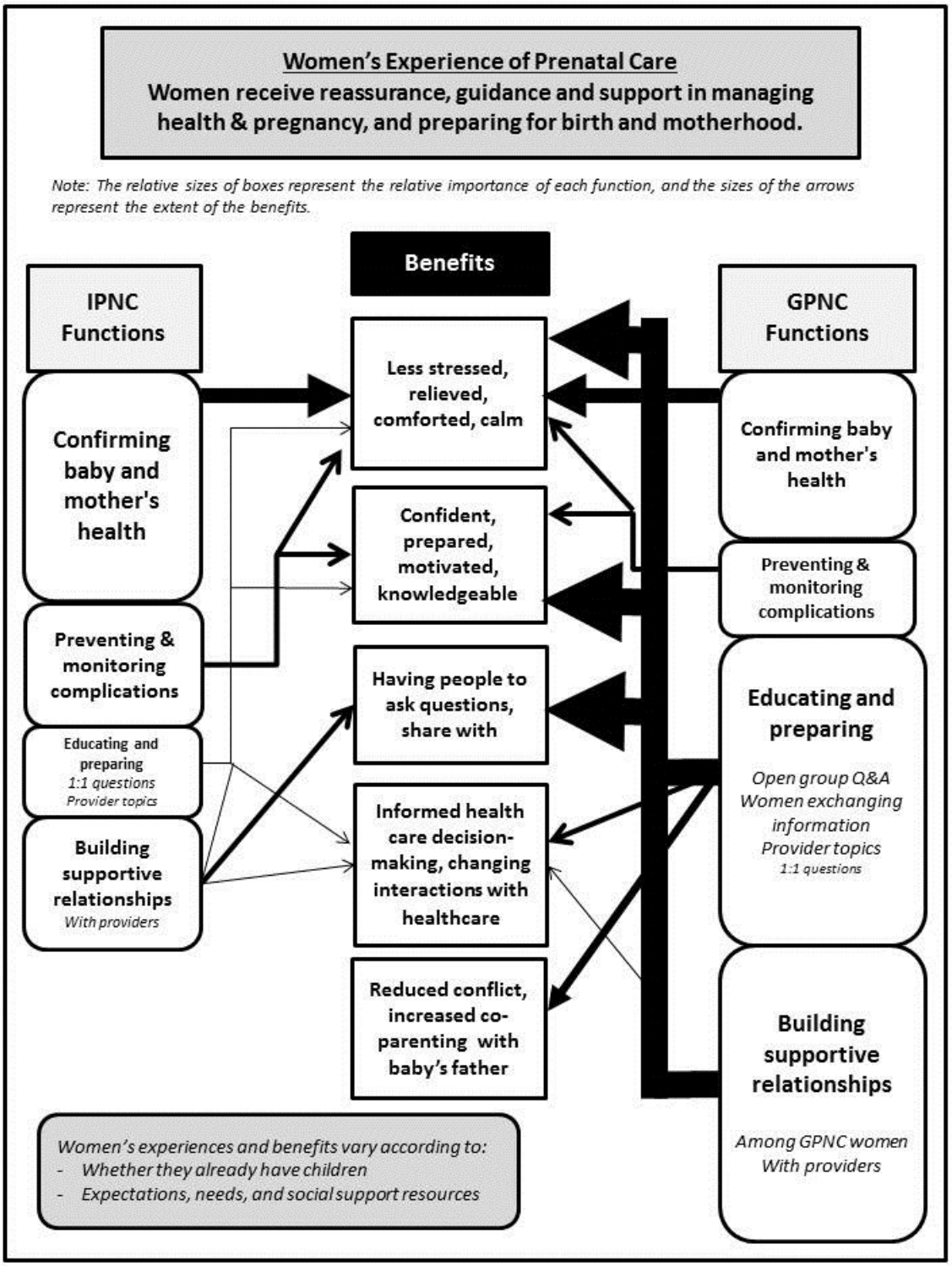

Figure 4.5 Functions and Benefits of IPNC and GPNC

Table 4.7 Comparison of Benefits for IPNC and GPNC Participants across Four PNC Functions: Participant Quotations

Confirming baby and mother's health (listening to the baby's heartbeat, measuring growth, receiving normal test results)	
IPNC	**GPNC**
"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." (28 years old, white, one other child)	"Today they finally told me that she's going to be—she doesn't have any down syndrome or anything like that, so that was a stress reliever because I was worried about that one." (21 years old, black, first-time mother)
Preventing and monitoring complications (excessive or insufficient weight gain, anemia, gestational diabetes, infection, pre-eclampsia, and preterm labor)	
"She had put me on a slight diet, which is helpful. So that's helping me make healthy choices of the way I'm eating, like eating more fruits and vegetables." (26 years old, black, one other child)	"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." (20 years old, black, first baby)
"I have a cyst on my ovary, so when I go in, I do ask questions about that and about me delivering. And they made sure that I will be okay and that nothing won't go wrong so they make me feel good about that so that I won't be worried or be scared." (21 years old, black, first baby)	"The Centering group really builds confidence in a woman, because you're doing, like I said, doing your own blood pressure and stuff, it puts you in charge, which empowers you. And I mean being in charge of myself and being better at it makes me feel like anything that goes wrong with my son, I can handle." (33 years old, white, two other children)

Educating and preparing (pregnancy symptoms, labor and delivery, infant care, managing in the postpartum period, breastfeeding, stress reduction, and postpartum contraception)	
IPNC	**GPNC**
Education through questions and answers example. "Well just it was helpful to know that there's something that could be done about the nerve pain, because sometimes it can get really bad and so that helps a lot and she did show me about some different positions that I can do to help relieve the pain from the baby pressing on the nerve." (24 years old, white, one other child)	*Education through questions and answers example.* "Do you know how like if you go to the doctor's office and you're sitting in a little doctor's office by yourself and it's kind of scary, and you don't know what to expect, and you have all these questions and you don't have the confidence to really ask them. If you're in a group like the Centering group and the other girls start asking questions and it makes you feel like, "Oh, well then I can ask my question." Or then some of the other girls will ask questions that you might have thought of but not asked, or the questions that you wouldn't have thought of but was something that you were happy that they asked because it was something that you felt you needed to know. So it's like you get more answers to questions that you didn't even think to ask for one." (33 years old, white, two other children)
Labor, delivery, and postpartum preparation examples. "I wish they could tell me more about it, but I'm pretty sure I'll ask on my next appointment. Just more about the delivery part, because we've never really like discussed just the delivery part by itself and I'm pretty sure that's going to come up now since it's around the time." [Note participant had her baby without having the chance to ask her questions about labor and the hospital.] (22 years old, black, first baby)	*Labor, delivery, and postpartum preparation examples.* "So it's always nice for me personally to hear from women who have—who have already had children because it kind of gives me a little bit more to expect, It kind of takes my worry down some." (20 years old, white, first baby) "It's definitely a positive because in reassuring them, it is also reassuring me. I mean because it has been so long that it is easy to forget. But when you are sitting there remembering your experience to tell someone now, it is kind of like, 'Hey, it wasn't a big deal.'" (33 years old, white, two other children)

Educating and preparing (continued)	
IPNC	**GPNC**
"I'm thinking, I didn't do the Centering class. I'm saying maybe I should have done the Centering class to be with more women…I feel like maybe I should have talked to a lot more moms about bringing the baby home, what happens in that first month. I think I should have known more about that, just talking more about that with people." (42 years old, black, first baby) "I didn't feel like I got as much, like with my son they went through everything with me, and really prepared me and said, 'You know, you're going to be going through these feelings and these feelings and these feelings,' so when I went through them with my son, it wasn't a shock. This one I didn't expect all these feelings." (28 years old, white, one other child)	"It made me more confident in being a mom because when I first was in Centering I thought that, when I came home or I thought that when I was pregnant, whatever, that I wasn't going to be a good mom. Just because it's my first time and I'm scared that I would mess up or something like that. So for them to prepare me ahead of time, let me know what I should do to try to be a good mom; that helped me out more. That made me a better person." (19 years old, black, first baby) "Well before, I was just in the middle like I don't know if I want to do it [breastfeeding] or not but after watching the video and speaking to class, talk to everyone, it made me want to do it." (21 years old, black, first baby) *Relationship with baby's father* "He knows, 'Well okay, if this happens, this is what I have to do,' and of course, if I need help. I think he feels more comfortable and he know a good bit of stuff as far as caring for the baby, since he was able to come to Centering with me…It makes us closer, because I know I feel more comfortable, like 'Okay, I'm able to do whatever because Daddy feels comfortable doing this.' It makes me a little more free to do other things." (24 years old, black, two other children)
Building supportive relationships (with providers, with other women in GPNC)	
IPNC	**GPNC**
Open, trusting provider relationships "I guess 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 due to the fact that I trusted her and I was able to talk to her about some things." (26 years old, black, one other child)	*Open, trusting provider relationships* "Them being doctors and everything you feel like people come in, that they're pregnant or whatever, you're not married, you're very, very young and got a baby …[but] they're no sneering down or anything at you or making you feel very low. They are very encouraging. They encourage you to ask as many questions as you want and don't make you feel silly." (20 years old, black, first baby)

Building supportive relationships (continued)	
IPNC	**GPNC**
"When I came back here a couple of weeks ago and had the issues with the depression, it did have an impact, because where with my son, I never came and got help because I didn't feel like anybody really cared, and they always treated me like I didn't know what I was talking about. I didn't come get help. With this time, when people were understanding, and I sought help. And it made a difference." (28 years old, white, one other child) *Negative provider interactions* "So it's not that she didn't really answer. It's just I'm concerned with it, but she's not concerned with any of the things that I'm concerned about... I wish that she would at least address my concern in a better way. I'm not the doctor. I'm not the nurse but to just be like, 'Oh no, you're just fine,' and me thinking it's not fine, that's not comforting." (28 years old, white, one other child)	"I can pretty much tell her any issues that I'm having or any questions that I have and I mean, she's totally—I mean, it's like I'm talking more to a friend who knows about it, than a doctor who just tells you what you should feel and all this other stuff, they explain everything to you when you're like, 'Why is this doing this? I've never heard of that?' They'll explain it you. It takes a lot of that stress away." (21 years old, white, first baby) "I got comfortable, like with them to just to ask a million things. In the hospital, at Centering. I just asked whatever I felt like I didn't know or I didn't quite understand." (20 years old, black, first baby) *Negative provider interactions* "They didn't seem any bit of concern, I think that's what more upset me and made me not want to go, because they didn't show any concern that I had been sick and they pretty much told me, 'You weren't sick.'" (18 years old, white, first baby – switched to IPNC) *Relationships with other women in GPNC* "It's a neat to just be able talk to other first time mothers and second and third time mothers and have everybody in there with you, it just makes you feel so much more at ease when you just kind of get to relax. You're not like, 'Oh my God, what's the doctor going to tell me today? What's wrong with me today?'" (20 years old, white, first baby) "Every time I left, even sometimes I didn't want to go, I was like, 'Oh goodness, two hours is a long time. I have so much stuff I could be doing.' And then every time I left, it was, I felt better, like a little bit more refreshed and stuff." (31 years old, black, second baby)

receiving normal test results, and assurances that minor illnesses (and approved medications) would not harm the baby.

Preventing and monitoring medical complications

Women from both PNC models identified preventing, monitoring, and minimizing the negative impact of medical complications as a second PNC function. These complications included excessive or insufficient weight gain, anemia, gestational diabetes, infection, pre-eclampsia, and preterm labor. Most commonly, women from both groups discussed using provider guidance on selecting healthy foods and portion sizes in order to better manage their pregnancy weight gain (and for a few, their gestational diabetes). Some women also described providers prescribing iron supplements, conducting additional ultrasounds, monitoring contractions, giving weekly shots to prevent preterm labor, and recommending rest or reduced work hours. While some of these health issues caused worry, women's sense that providers were conducting the necessary assessments and tests and making appropriate recommendations was reassuring. Three women (two IPNC, one GPNC) described instances where they believed that their particular pregnancy issues – timing of gestational diabetes testing, assessment of baby's position, and managing gestational diabetes to avoid induction – were not adequately addressed by their provider, and they felt worried or disappointed as a result.

Some GPNC participants indicated they increased their knowledge and the responsibility they felt for their health by taking their own blood pressure and weight. Generally, women enjoyed these tasks, and some thought it was more efficient than waiting for a nurse to perform these tasks.

Educating and Preparing

1. Summary of differences in how IPNC and GPNC provide education and preparation.

Women portrayed IPNC education as being prompted by the specific questions women had, and described limited provider-initiated education. This met some women's needs. GPNC participants experienced substantially greater benefits from the educational function of their PNC than did IPNC participants. While this is partly because GPNC sessions have more time for provider-delivered curriculum, GPNC participants discussed the importance of open time for questions and answers in the group setting. For women who did not think to ask or were uncomfortable to raise specific topics, GPNC may be particularly beneficial.

GPNC participants also described the benefits of learning about other women's experiences and using the group to inform their decisions. First-time mothers particularly benefitted from hearing the experiences of women with children, who in sharing their experiences, also gained suggestions or opinions changing their views or expectations for their new baby.

2. Pregnancy symptoms.

For women in both PNC models, women valued talking with their provider about symptoms related to pregnancy. Women wanted to understand what was causing a particular symptom, whether it was normal, and what they could do; issues included heartburn, allergies, back pain, sciatica, difficulty sleeping, and tiredness. Women left their appointments feeling better prepared or less stress because they got advice they could use (e.g., stretches, maternity belt), or because they found out what they were

experiencing was normal. GPNC participants had the added benefit of learning other women had the same concerns.

3. Contraception.

Women in both IPNC and GPNC described learning about contraception options, discussing the best option for them, and making informed decisions for postpartum contraceptive methods or tubal ligation. Women valued learning about different methods so they could make their own decisions; GPNC participants described greater exposure to different methods and women's experiences through group discussion.

4. Labor and delivery.

For first time mothers participating in GPNC, the benefits of learning the signs and stages of labor, pain management, and hospital procedures included feeling reassured, prepared, less anxious, and confident. Women with children also benefitted from learning more about labor and birth. While not a common theme, one participant described how hearing different possible scenarios (i.e., emergency Cesarean sections), created some additional anxiety.

IPNC did not prepare first-time mothers for labor, leading to feelings of disappointment or frustration. IPNC helped women who already had children feel prepared for labor through responding to individual issues women raised, including signs of labor, scheduling and preparing for repeat Cesarean sections, and discussing vaginal birth after Cesarean.

5. Infant care and the postpartum period.

For first time mothers, GPNC education on infant care and the postpartum period reduced stress and improved confidence during pregnancy, and proved highly useful to

women in caring for their infant and themselves during the early postpartum period. Several GPNC women described having the confidence and knowledge to care for their infants, including departing from family members' suggestions or traditions to follow PNC recommendations. Two of the GPNC women with children also described new knowledge they used postpartum, because guidelines changed or they did not remember the information from the time of their older children's births. The group discussions also helped them prepare for adjusting their family to a new child. GPNC participants described at length the benefits of breastfeeding education, from helping make the decision to try it, to feeling more confident, to continuing even through challenges.

Two IPNC first-time mothers clearly articulated that they wished they had learned more about infant care and the postpartum period and that GPNC may have been a better choice. Several IPNC women with children described that they could have benefited from more preparation for their new baby, suggesting that they and their provider may have inaccurately assumed they already had the experience and knowledge they needed for the postpartum period, or that this was outside the scope of PNC. Women rarely identified breastfeeding as an IPNC topic. Two IPNC women had participated in GPNC with their first pregnancy and described using some of that knowledge in their current pregnancy and postpartum experiences.

6. Stress reduction techniques.

Six GPNC participants recounted benefiting from learning stress reduction techniques, a topic not described by IPNC participants. Some women practiced breathing and relaxation exercises on their own, into the postpartum period.

7. Education and preparation for fathers.

Women described varying effects of GPNC on the babies' fathers (including no effects), depending on the nature of their relationships, the mother's age, and whether the baby's father also attended. Several, mostly younger women participating in GPNC, found it helpful for their baby's fathers to hear from the other women and the provider about common issues (e.g., changes in sex drive, hormones), so they would be "patient;" GPNC discussions made it easier to talk about pregnancy and parenting issues outside of PNC. Several GPNC women described how fathers' increased knowledge helped improve relationships because both parents were on the same page, fathers knew some of the basics about caring for their baby, and understood that women needed help and support.

Women said IPNC did not influence their relationships with the baby's father at all (some were surprised by the question), but said that IPNC provided a helpful opportunity for men to learn about pregnancy and birth if they chose to attend the appointments. Some of these women described their relationships with the baby's father as strong to begin with, so PNC could not influence them to be any better.

Building Supportive Relationships

1. Provider relationships.

Establishing a trusting relationship with their provider was an important function for many women regardless of PNC model. Women discussed the importance of feeling they could be open, ask any question, not feeling rushed, and that their provider was concerned, responsive, and respectful. For IPNC participants, the continuity of having the same provider throughout pregnancy facilitated the development of a trusting relationship; GPNC participants described how the extra time afforded by the group

sessions helped develop a strong relationship with their provider. A few women commented prenatally they wished they could have the same provider during delivery.

Supportive, trusting provider relationships helped women feel at ease during their appointments and comforted knowing they had someone to turn to with questions and for advice when needed. For a few women (two IPNC participants with children, one GPNC first time mother), their PNC provider relationship changed how they interacted with the healthcare system postpartum. One IPNC woman felt comfortable seeking help for postpartum depression because she trusted and felt respected by her PNC provider. One GPNC participant described building confidence to ask more questions, and one IPNC participant described how having options and choices during PNC has made her ask for options and alternatives in her pediatrician visits.

Supportive relationships were not always evident, potentially causing some frustration or distress. One IPNC participant described feeling unhappy and frustrated because her provider was quick to dismiss her concerns. One GPNC participant described feeling she did not have time or privacy to ask questions and felt like she was coerced into accepting the flu vaccination; she switched to IPNC as a result.

2. Relationships with other women in the group setting

Most GPNC participants highlighted the benefits of the supportive group environment. While IPNC appointments may provide a chance to confirm that nothing is wrong and answer individual questions, GPNC provided the opportunity for preparation, guidance, and reassurance through the interactions with their provider *and* other women. They shared common concerns and experiences, supported each other, and adapted to pregnancy and pending motherhood together. Women described GPNC as an opportunity

to relax, making it easier to stay positive in the face of stress, and helping them feel less worried and more capable that they could manage their feelings, labor, and taking care of their babies.

Discussion

Women's core experience of PNC is to receive reassurance, guidance, and support in managing their health, their pregnancy, and preparing for birth and motherhood. This core experience encompasses four important functions, confirming health, preventing and monitoring medical complications, educating and preparing, and building supportive relationships. Regardless of parity or PNC model, women described the considerable emotional comfort they experienced by having their provider confirm the fetus was healthy and their pregnancy was progressing normally. While the medical literature has not established the effectiveness of routine medical assessments and tests in preventing adverse clinical outcomes, particularly preterm birth and low birth weight (Fiscella, 1995; Lu, et al., 2003), in our study these routine assessments coupled with provider reassurance relieved women's fears that their fetus was unhealthy or at risk. This benefit has received scant description in the literature but is significant for women (Blackwell, 2002).

In order to prevent or reduce the negative impact of medical complications, women in both PNC models described considering or following provider advice on a variety of health behaviors, adding to the evidence base that women will follow anticipatory guidance when providers offer it during PNC (Vonderheid, et al., 2007). Even when concerned about emerging health issues in pregnancy (e.g., gestational diabetes), women felt reassurance when providers monitored, recommended, and

arranged treatment. Because the women in this study were medically low-risk, this function was not as prominent in interviews as it may be with medically high-risk pregnant populations. In the few examples from pregnancy interviews where women perceived providers were not adequately monitoring their pregnancy or providing them with sufficient guidance, women felt concern or disappointment. This finding corresponds with research identifying patient perspectives on their provider's thoroughness of examinations and quality of explanations as aspects of PNC satisfaction (Raube, Handler, & Rosenberg, 1998) and also suggests impacts on patient's stress and engagement in care.

GPNC and IPNC differed both in the scope and nature of educating and preparing women for pregnancy, labor, and the postpartum period. For IPNC participants, education regarding pregnancy symptoms, labor, birth, and the postpartum period was primarily provided when women asked specific questions. During pregnancy, IPNC women viewed this individualized, responsive education as a benefit. Reflecting from the postpartum period, some IPNC women described regretting not learning more in PNC. In contrast, GPNC women derived stress reduction and an increased sense of competence prenatally through the proactive education provided through GPNC; GPNC women also benefitted in the postpartum period by having skills and knowledge for breastfeeding and infant care. Some GPNC women described improved relationships with their baby's fathers resulting from the group education. Contrasting these experiences indicates how women may not realize prenatally the range of educational topics from which they could benefit and thus not raise questions with providers in the context of a brief medical appointment.

Women from both models identified as beneficial having a trusting and respectful relationship with their provider, a critically important aspect of quality care identified by women in multiple studies (Bennett, et al., 2006; Lori, et al., 2011; Novick, 2009). While GPNC and IPNC participants may develop provider relationships differently, women feel reassured knowing they have a provider that listens, understands, and respects them. This study and others demonstrate how PNC provider relationships can have lasting effects; positive relationships can influence women to seek help and become more activated with the healthcare system, while negative relationships can lead to women holding back on issues of concern, withdrawing from care, or creating feelings of distrust and distress (Sheppard, et al., 2004; Tandon, et al., 2005; Wheatley, et al., 2008).

Our findings extend the previously described positive experiences with GPNC to specify how women connect the functions of GPNC with explicit benefits prenatally into the postpartum period (Herrman, et al., 2012; Kennedy, et al., 2009; McNeil, et al., 2012; Novick, et al., 2011; Novick, et al., 2012; Risisky, et al., 2013). The group structure, combining extended provider interactions with the opportunity to share and learn from other women's questions and experiences, provided a key mechanism through which women gained greater benefits in education and preparation compared to IPNC. Women also articulated how the opportunity to connect with other pregnant women reduced stress, normalized concerns, and promoted their sense of well-being.

While these four functions and their differential benefits by PNC model emerged as themes across interviews, individual experiences varied considerably. Several IPNC participants described appointments that were brief, medically focused, with sufficient opportunity for questions if they had them; women benefited from knowing their baby

was healthy and getting questions answered. This met their needs. Other IPNC participants described experiences overall that were satisfactory in terms of provider relationships and medical monitoring but may have lacked some educational or preparation benefits. Variation also occurred in GPNC participants, with some emphasizing sharing knowledge and developing connections with other women, and some emphasizing the education and provider time as most meaningful. This diversity of experience indicates women have different expectations and needs for PNC, and tailoring care would better address women's needs.

Our study had several strengths and limitations. By meeting women face-to-face initially, we were able to establish rapport with participants for the serial phone interviews. Women said they preferred the convenience of the phone interviews, including text messages both reminding women of their next interview and asking women when they preferred to be contacted. Several remarked they enjoyed participating, indicating the serial phone interviewing minimized participant burden and was suitable and respectful to participants. While our study population reflected the parity and racial characteristics of the clinic, a small number of GPNC women with children and IPNC first-time mothers were recruited. Also, women were not recruited until their second trimester and were not interviewed after every PNC visit. Therefore, the findings may not fully represent women's initial experiences with PNC, the full extent of the topics covered in PNC visits, and the variations by PNC model between first-time mothers and women with children. Lastly, an overlapping group of nurse practitioners and certified nurse midwives provided both models of care. Further research assessing women's initial PNC experiences and health promotion discussion and effects

with a diverse group of women and providers is needed to further develop a comprehensive view of women's experiences with different PNC models.

The PNC functions and benefits *defined by women* in this research indicate that outcomes beyond medical and utilization measures are valuable. While women want to maximize their chances for having a healthy baby, other outcomes are important for women in PNC: reducing pregnancy-related stress; developing confidence and knowledge for improving health; readiness for labor, delivery, and infant care; and having supportive relationships. Achieving these other outcomes are particularly relevant in a healthcare system prioritizing patient-centered care and improved birth outcomes and should be part of ongoing policy development and research for women's healthcare.

Providing medical care in group settings is gaining attention in medicine, particularly the management of chronic diseases, and has demonstrated increased patient and provider satisfaction, improved health outcomes, and reduced costs (Jaber, Braksmajer, & Trilling, 2006). This study contributes to the existing PNC literature that GPNC confers additional educational and psychosocial benefits compared to IPNC, and efforts to increase the availability of high-quality GPNC can provide interested women with choices in PNC.

This study also provides direction for changing how IPNC is delivered. Practices where women see a different provider during each PNC visit should consider whether that delivery model best meets the preferences of women. While providing health promotion and counseling in response to the questions women raise in IPNC appointments may seem to individualize care to women's needs, women do not always know what questions to ask; provider-initiated discussions of common concerns and

health promotion topics may partially replicate the benefits GPNC participants described from the open group discussion in the IPNC setting. Refocusing and retraining providers on the value of building positive relationships with pregnant women, providing supportive reassurance, making individualized assessments of risks and educational needs, and covering health promotion topics can better align IPNC with the aims of PNC set forth by the US Public Health Service (United States Public Health Service, 1989).

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CHAPTER 5: CONCLUSION

5.1 Summary of Findings

Specific Aim 1

The first aim is to examine whether GPNC (vs. IPNC) participants demonstrate significantly greater positive psychosocial outcomes in their third trimester of pregnancy and at 6 weeks postpartum. I investigated four hypotheses for this aim. I used multiple regression models to test whether GPNC participants had significantly greater improvements in outcomes or attained better outcomes compared to IPNC. For outcomes at late pregnancy, analyses adjusted for demographics, survey 1 social support, life optimism, pregnancy intendedness, life stressors in pregnancy, pregnancy risk factors (previous preterm birth and gestational diabetes diagnosis), and Nurse-Family Partnership participation. For postpartum outcomes, multiple regression models adjusted for survey 1 social support, life optimism, pregnancy intendedness, life stressors experienced postpartum, adequacy of prenatal care, and Nurse-Family Partnership participation. All analyses were done as intent-to-treat on complete cases, then with imputed data, with secondary analyses comparing women who were retained in their initial group assignment (i.e., did not switch from GPNC to IPNC).

The first two hypotheses compared the main effects of each PNC model. The first hypothesis was GPNC participants would demonstrate significantly greater positive changes (i.e., difference scores) compared to IPNC participants in prenatal distress and

prenatal coping in late pregnancy, and in perceived stress, depressive symptoms, and positive and negative affect in late pregnancy and at six weeks' postpartum. GPNC participants did not demonstrate greater positive changes compared to IPNC participants for any of these outcomes.

The second hypothesis was GPNC participants compared to IPNC participants would demonstrate significantly higher levels of pregnancy-related empowerment in late pregnancy, and higher levels of postpartum maternal-infant attachment and maternal functioning. GPNC participants did not demonstrate higher levels of these outcomes compared to IPNC.

The second two hypotheses were that GPNC may have different effects for women in specific psychosocial risk or demographic groups. I conducted a set of moderator analyses where I included interaction terms (group assignment x moderator) separately in the multiple regression models described above for each outcome and completed planned linear contrasts testing group assignment for each of two levels of the moderator.

The third hypothesis postulated GPNC participants entering the study with low social support or high prenatal distress would experience greater positive psychosocial outcomes compared to IPNC participants with similar risks. In analyses with complete cases, GPNC women with inadequate social support demonstrated a 3.16 point greater decrease ($p=0.034$) in prenatal distress compared to IPNC women with inadequate social support. These GPNC participants entered the study with greater mean prenatal distress. GPNC women with high prenatal distress had a 7.96 point greater increase ($p=0.008$) in planning-preparation coping, compared to IPNC women with high stress. Postpartum,

GPNC women with high survey 1 prenatal distress demonstrated a 6.04 point greater decrease (p=0.013) in their depressive symptom scores compared to high-stress IPNC women. GPNC women with inadequate survey 1 social support demonstrated a 5.22 point greater decrease (p=0.009) in their negative affect scores compared to IPNC women with low support. The pattern of differences was maintained in analyses with the imputed data, but the magnitudes of the differences were attenuated. We found that the primary reason was that the imputed cases tended to be in the middle of the distributions for outcomes.

The fourth hypothesis postulated that GPNC participants who are black or first-time mothers would experience greater positive psychosocial outcomes compared to IPNC participants in these demographic groups. Among black women and among primiparous women, no differences in outcomes by PNC model were detected.

While GPNC did not confer psychosocial benefits across all participants, women who were at greater psychosocial risk in areas GPNC specifically addresses – social support and prenatal distress – benefitted from participation in GPNC. These findings are similar to the Ickovics and colleagues' RCT, where women at greater psychosocial risk participating in GPNC demonstrated improved outcomes. Women with high initial perceived stress had several improved outcomes when they were randomly assigned to GPNC, including reduced stress, social conflict, and depression, and increased self-esteem; improvements in depression and social conflict were maintained through one year postpartum (Ickovics, et al., 2011). This RCT and the Kennedy et al. RCT included prenatal distress as an outcome, but did not report subgroup analyses and did not find overall GPNC effects on prenatal distress (Ickovics, et al., 2007; Kennedy, et al., 2011).

Few other comparisons between this study's findings and published GPNC research can be made. While coping strategies are central to understanding stress and its effects, they are rarely assessed in intervention studies with pregnant women, and no other studies comparing GPNC and IPNC included coping measures. The effectiveness of the observed increased use of planning-preparation strategies among GPNC participants with high survey 1 prenatal distress deserves further investigation. We did not find that GPNC participants, including at-risk subgroups, reported greater pregnancy-related empowerment, maternal-infant attachment, or maternal functioning. In both PNC models, women reported high levels of empowerment, attachment, and functioning, suggesting a ceiling effect and perhaps a need for more precise outcomes measurement. No other studies comparing IPNC and GPNC have included similar postpartum measures.

Specific Aim 2

The second aim of this research is to develop an in-depth understanding of the meanings and effects women attribute to PNC on their well-being and health and their babies' health throughout pregnancy and into the early postpartum period, in the context of their pregnancies and life experiences. This involved investigating two research questions. First, how do women describe their PNC experiences, specifically the functions of PNC that they value and the effects on their well-being, health, and their babies' health? Second, how do these experiences vary by PNC model and for women based on parity?

To accomplish this aim, we conducted a prospective, longitudinal, qualitative study with 14 IPNC and 15 GPNC women recruited from the quantitative study, including women with different ages, races, parity, and stress levels. Women participated

in one face-to-face interview (mean gestational age 21.9 weeks), followed by up to four brief monthly phone interviews during pregnancy, with postpartum phone interviews at approximately three and six weeks postpartum. Interviewers used semi-structured interview guides to assure a systematic approach to each interview while permitting the interviewer to adopt a conversational style and further explore particular themes with participants (Patton, 2002). Grounded theory guided the data collection and analysis (Corbin & Strauss, 2008). As the first interviews were completed, transcribed, and analyzed, I identified preliminary themes. These themes were tested and modified through coding subsequent interviews and writing detailed theme and summary memos. Emerging themes were explored in further interviews or with different participants. Matrices and case summaries were created to facilitate the drawing and verification of conclusions (Miles & Huberman, 1994). Throughout data collection and analysis, I engaged with members of the research team in peer debriefing and ongoing review of matrices, memos, conceptual models, and coding to assure validity. I developed matrices comparing themes across PNC model and by parity as a strategy for triangulating multiple sources. The serial interviewing structure provided an opportunity for member checking of themes from earlier interviews.

Women's central experience of prenatal care was to receive reassurance, guidance, and support in managing their health, their pregnancy, and preparing for birth and motherhood. Women described four prenatal care functions contributing to this central experience: confirming baby and mother's health, preventing and monitoring medical complications, educating and preparing, and building supportive relationships. IPNC participants talked most about the confirming health function, with secondary

emphasis on preventing or monitoring complications and building supportive provider relationships; women described fewer benefits of educating and preparing. The confirming health function was also quite important for GPNC participants, but women described the educating and preparing, and building supportive relationships functions and benefits at length.

Confirming baby and mother's health. Throughout their pregnancies, both GPNC and IPNC participants described how provider confirmation of their and their baby's health made them feel relieved and reassured. Nearly all women, regardless of PNC model and whether or not it was their first baby, identified this reassurance as an important or meaningful part of their care. While the medical literature has not established the effectiveness of routine medical assessments and tests in preventing adverse clinical outcomes, particularly preterm birth and low birth weight (Fiscella, 1995; Lu, et al., 2003), in our study these routine assessments coupled with provider reassurance relieved women's fears that their fetus was unhealthy or at risk. This benefit has received scant description in the literature but is significant for women (Blackwell, 2002).

Preventing and monitoring medical complications. Women from both PNC models identified preventing, monitoring, and minimizing the negative impact of medical complications as a second PNC function. These complications included excessive or insufficient weight gain, anemia, gestational diabetes, infection, pre-eclampsia, and preterm labor. For some participants, emerging health issues caused worry, but women's sense that providers were conducting the necessary assessments and tests and making appropriate recommendations was reassuring. Women in both PNC models described

considering or following provider advice on a variety of health behaviors, adding to the evidence base that women will follow anticipatory guidance when providers offer it during PNC (Vonderheid, et al., 2007).

Educating and preparing. Educational topics included pregnancy symptoms, contraception, labor and delivery, infant care and the postpartum period, and stress reduction techniques. Women portrayed IPNC education as being prompted by their specific questions, and described limited provider-initiated education. During pregnancy, IPNC women viewed this individualized, responsive education as a benefit. Reflecting from the postpartum period, some IPNC women described regretting not learning more in PNC. GPNC participants experienced substantially greater benefits from the educational function of their PNC than did IPNC participants. While this is partly because GPNC sessions have more time for provider-delivered curriculum, GPNC participants discussed the importance of open time for questions and answers in the group setting. For women who did not think to ask or were uncomfortable to raise specific topics, GPNC may be particularly beneficial. GPNC participants also described the benefits of learning about other women's experiences and using the group to inform their decisions. First-time mothers particularly benefitted from hearing the experiences of women with children, who in sharing their experiences, also gained suggestions or opinions changing their views or expectations for their new baby. Most GPNC women derived stress reduction and an increased sense of preparation for labor; GPNC women also benefitted in the postpartum period by having skills and knowledge for breastfeeding and infant care. Some GPNC women described improved relationships with their baby's fathers when the fathers participated and gained knowledge. Contrasting these experiences indicates how

women may not realize prenatally the range of educational topics from which they could benefit and thus not raise questions with providers in the context of a brief medical appointment.

Building supportive relationships. Establishing a trusting relationship with their provider was an important function for many women regardless of PNC model. Women discussed the importance of feeling they could be open, ask any question, not feel rushed, and that their provider was concerned, responsive, and respectful. For IPNC participants, the continuity of having the same provider throughout pregnancy facilitated the development of a trusting relationship; GPNC participants described how the extra time afforded by the group sessions helped develop a strong relationship with their provider. Supportive, trusting provider relationships helped women feel at ease during their appointments, comforted knowing they had someone to turn to with questions and for advice when needed, and for a few women, increased help-seeking behaviors or comfort in asking questions and requesting information postpartum. Positive provider relationships were prominent but not always evident in our study; negative provider interactions decreased engagement in care and caused distress for a small number of women.

A positive provider relationship is a critically important aspect of quality care identified by women in multiple studies (Bennett, et al., 2006; Lori, et al., 2011; Novick, 2009). This study and others demonstrate how positive relationships can influence women to seek help and become more activated with the healthcare system, while negative relationships can lead to women holding back on issues of concern, withdrawing

from care, or creating feelings of distrust and distress (Sheppard, et al., 2004; Tandon, et al., 2005; Wheatley, et al., 2008).

GPNC participants also built supportive relationships with other women in their group. While IPNC appointments may provide a chance to confirm that nothing is wrong and answer individual questions, GPNC provided the opportunity for preparation, guidance, and reassurance through the interactions with their provider *and* other women. Women shared common concerns and experiences, supported each other, and adapted to pregnancy and pending motherhood together. Women described GPNC as an opportunity to relax, making it easier to stay positive in the face of stress, and helping them feel less worried and more capable that they could manage their feelings, labor, and taking care of their babies.

The comparatively greater benefits of the GPNC educating and preparing and relationships functions described in this study align closely with other qualitative studies of women participating in GPNC. In previous studies, women have described getting more than they knew they needed (McNeil, et al., 2012), valuing not feeling alone in their experience (Kennedy, et al., 2009), and described how GPNC is a social process different from a medical appointment (Novick, et al., 2011). Other studies have also described how group learning promotes understanding, and changes pregnancy attitudes and women's management of their health (Herrman, et al., 2012; Novick, et al., 2011). Our findings extend these previously described positive experiences with GPNC to specify how women connect the functions of GPNC with explicit benefits prenatally and into the postpartum period. While women receive psychosocial benefits from both IPNC and

GPNC, GPNC confers additional educational and psychosocial benefits, primarily through providing education, preparation, and support in a group setting.

5.2 Integration of Quantitative and Qualitative Results

In this mixed methods study, the quantitative and qualitative data were collected concurrently and analyzed independently. Comparing and integrating the quantitative and qualitative findings is the final step in the analysis process (Creswell & Plano Clark, 2011). The goal of this comparative summary is to use the qualitative findings to interpret and critically appraise the psychosocial outcomes from the quantitative study and to identify different, salient processes and outcomes needing further research. In Table 5.1, the types of benefits women described attaining through PNC in the qualitative interviews are compared to the study's quantitative measures. Women often described multiple overlapping benefits resulting from a single PNC interaction (e.g., reduced anxiety and increased confidence); dividing the benefits into categories facilitates comparisons with the quantitative measures but does not mean women experienced the different benefits singly. Women also described considerable variation in individual experiences with PNC functions and benefits, indicating the importance of examining heterogeneous treatment effects for subgroups of women based on their needs or risk factors.

The qualitative interviews supported the value of investigating quantitatively whether GPNC participants demonstrate greater improvements than IPNC participants in prenatal distress, depressive symptoms, planning-preparation coping, and affect, and to a lesser extent, perceived stress (Table 5.1). The qualitative interviews also provided evidence that self-efficacy, preparation, or knowledge outcomes related to labor,

Table 5.1 Comparison of PNC Benefits from Qualitative Interviews to Quantitative Outcome Measures

Benefits described in qualitative interviews	Quantitative Measures	Comparison	Conclusion
Less stressed, relieved, comforted, and calm	Prenatal distress (PDQ)	The PDQ items reflect the pregnancy-related worries impacted by PNC that women described in interviews. Multiple regression results indicated some improvement in prenatal distress for GPNC women with inadequate social support, but impact was small and attenuated with imputed data. Multiple regression analyses for items most relevant to PNC education based on interviews did not demonstrate differences by PNC model.	Interviews and scale items largely congruent. Rating scale included three levels of worry: not at all, somewhat, or very much. This limited range may restrict the measure's sensitivity for capturing change. Also, women may not change their level of concern but may change their appraisal of their coping ability.
Less stressed, relieved, comforted, and calm	Depressive symptoms (CES-D) Positive and negative affect (PANAS)	The scale items reflected the emotional states impacted by PNC that some women described in interviews. Multiple regression results indicated postpartum improvement in depression for GPNC women with high initial prenatal distress and improvement in negative affect for GPNC with low initial social support. Results attenuated with imputed data. No impact on positive affect.	Despite congruency of interviews and scale items, no difference by PNC model was observed in late pregnancy. Women completed survey 2 at a mean of 32 weeks, with an average of seven more weeks of PNC (5-6 visits); greater changes may have been observed if measurement occurred later.

Benefits described in qualitative interviews	Quantitative Measures	Comparison	Conclusion
Less stressed, relieved, comforted, and calm	Perceived stress (PSS)	Women predominantly discussed decreased anxiety and feeling comforted in relation to pregnancy, birth and parenting issues, not overall life stress. Some women expressed that they did not expect PNC to help them manage work or home stressors. One GPNC participant attributed an increase in confidence and control over her life to GPNC, and one woman described how having GPNC helped her "get through" stressful circumstances. Multiple regression results found no effects on PSS by PNC model.	Interviews provided less description of changes in appraisals of perceived life stress, suggesting this may be a less common GPNC outcome accounting for insignificant results in this sample.
Confident, prepared, motivated, and knowledgeable	Pregnancy-related Empowerment Scale (PRE)	GPNC participants described becoming confident, prepared, and knowledgeable about labor, birth, and the early postpartum period. Some women in both IPNC and GPNC described becoming motivated to follow provider advice on nutrition and weight gain. PRE includes a few items on healthy pregnancy and responsibility for healthy choices. Multiple regression results of scale sum did not indicate differences in PRE by PNC model. Multiple regression on weight gain knowledge item and ability to change unhealthy parts of life item indicated GPNC participants with high survey 1 prenatal distress had better scores. Items were measured at one time point only so observed differences on these two items may be the result of unmeasured selection bias.	None of the quantitative scales measured feelings of self-efficacy or preparation related to labor, parenting, infant care, or breastfeeding. This was a significant theme in interviews and requires further research that addresses selection bias and measures change.

Benefits described in qualitative interviews	Quantitative Measures	Comparison	Conclusion
Confident, prepared, motivated, and knowledgeable	Maternal-infant attachment (MPA)	The multiple regression analyses did not detect any differences by PNC model, and attachment scores were high for both PNC models. In the qualitative interviews, we asked women how they thought PNC affected them as a parent or how they adapted to motherhood; while GPNC participants described differential benefits related to knowledge, stress, and confidence, they did not describe benefits in terms of bonding or attachment with their babies.	Qualitative interview themes do not support measuring maternal-infant attachment as a self-reported PNC outcome.
Confident, prepared, motivated, and knowledgeable	Postpartum maternal functioning (BMFI)	Some IPNC mothers described areas where they would have preferred more PNC education or guidance to support their postpartum adjustment and GPNC first-time mothers found it difficult to imagine how they would have functioned as new mothers without the knowledge gained in PNC, but these differences did not translate into differential outcomes for self-reported maternal functioning. Several women also noted how knowledge gained in PNC did not eliminate the need to learn and adapt postpartum. One participant stated, "You can think you're prepared, but then the little munchkin's here, everything's a little different." The multiple regression analyses did not detect any differences by PNC model. Supplemental analyses indicate that among women with elevated depressive symptoms at survey 1, GPNC participants have higher postpartum functioning than IPNC participants.	The comparative benefits in confidence and preparation for GPNC participants suggest there could be a measureable impact on functioning, although none was detected in this study. The differential benefits of GPNC may accrue to a different subgroup of women than those hypothesized in Aim 1. Maternal functioning may also be affected by infant health characteristics not controlled for in this study.

Benefits described in qualitative interviews	Quantitative Measures	Comparison	Conclusion
Informed healthcare decision-making and changing interactions with healthcare	Pregnancy-related Empowerment Scale (PRE)	In interviews, women described how information they learned in PNC helped them make decisions about postpartum contraception, preferences for labor and their hospital stay, and infant feeding. GPNC participants described greater benefits than IPNC participants. Three women described examples of how their PNC experiences increased their help-seeking behavior or comfort in asking questions and requesting information postpartum. While several items from the PRE reflect this theme, e.g., having the right to ask questions, knowing who to talk to if something is going wrong, specific areas of decision making and changes over time were not measured. Multiple regression analyses detected no differences by PNC model.	This was an important benefit described in interviews, and overlapped with feelings of confidence and knowledge described above. This area was not well measured in this study and deserves further research.
Having people to ask questions and share	Pregnancy-related Empowerment Scale (PRE)	IPNC and GPNC participants described the benefit of having a provider they could talk to about questions and concerns. The collaborative relationships factor of the PRE reflects this theme. Multiple regression analyses indicated no differences by PNC model.	Interviews and scale items were congruent. GPNC and IPNC providers overlapped, and the benefits described qualitatively were similar across PNC models, suggesting women's experiences with provider relationships were in general similarly positive across PNC models in this study.

Benefits described in qualitative interviews	Quantitative Measures	Comparison	Conclusion
Having people to ask questions and share	Planning-preparation coping (R-PCI)	GPNC participants also described the benefit of sharing questions, concerns, and experiences with other pregnant women. This theme is largely reflected in the items measured by the planning-preparation coping strategies outcome, e.g., talking to people about what it is like to raise a child, asking doctors or nurses about the birth, thinking about what it would be like after the baby is born, planning how to handle the birth, getting advice and understanding about pregnancy, and talking to family or friends about what it is like to give birth. The qualitative interviews support the quantitative results, which indicated that GPNC participants with high survey 1 pregnancy distress demonstrated greater increases in their planning-preparation coping compared to similarly stressed IPNC participants.	Interviews and scale items largely congruent.
Reduced conflict and increased co-parenting with baby's father	Not measured	A small number of GPNC participants described this benefit of their baby's father participation in GPNC. This outcome was not measured quantitatively.	The Ickovics and colleagues' RCT did assess conflict within participants' social network and found that GPNC participants compared to IPNC participants with high initial perceived stress demonstrated greater decreases in social conflict in pregnancy and at one year postpartum, supporting that this is an important outcome for some GPNC participants.

parenting, infant care, and breastfeeding, as well as informed decision-making and the quality of interactions with healthcare providers are important to women, but these were not well measured in this study. A few GPNC participants described reduced conflict and increased co-parenting with the baby's father, benefits that were not measured in this study. While health behaviors were not a focus of this study, the qualitative interviews indicated that PNC affects women's knowledge and practice of healthy behaviors in pregnancy and postpartum. Lastly, the qualitative results suggested that postpartum maternal functioning is a relevant outcome measure despite the null quantitative findings in the planned moderator analyses. Supplemental analyses suggest that among women with elevated depressive symptoms at survey 1, GPNC participants compared to IPNC participants may experience higher levels of postpartum functioning, indicating a need for further research on postpartum effects.

This mixed-methods study was guided by a conceptual framework based on the stress, coping, and pregnancy outcomes literature (Figure 2.1). In sum, this framework hypothesized that GPNC decreases women's appraisals of pregnancy as stressful, broadens women's appraisals of their coping resources and strategies, and increases positive emotional states, leading to improved psychosocial well-being and birth outcomes. This conceptual framework included several potential mechanisms for how GPNC could impact psychosocial health and birth outcomes: through teaching different coping skills, changing expectations and knowledge for pregnancy and motherhood, influencing health behaviors, empowering women to take a more active role in their health, and providing opportunities for women to experience positive emotions. While the benefits women described in the qualitative interviews align well with this conceptual

framework and together indicate areas not fully addressed in the quantitative study, this framework has several limitations. The PNC functions women described in the qualitative interviews are not reflected explicitly, and the importance of the medical aspects of care in confirming health and reducing women's worries is not incorporated. Also, by not addressing IPNC, the framework does not describe how functions are similar across the two PNC models, but their relative emphasis and thus their benefits vary. The conceptual framework developed in the qualitative study better reflects women's experiences with the two models of PNC (Figure 4.5).

5.3 Study Limitations

The comparison of the qualitative and quantitative results in Section 5.2 demonstrates how conducting qualitative and quantitative data collection simultaneously, compared to first collecting and analyzing the qualitative data, led to missing the opportunity to collect quantitative measures on several psychosocial areas important to women. As a result, stress outcomes were sufficiently measured, but outcomes related to feelings of self-efficacy, preparation, knowledge, informed decision-making, and engagement in care were not well measured.

The timing and frequency of the quantitative data collection limited our ability to measure the full impact of PNC on psychosocial outcomes. Assessing stress and planning-preparation coping strategies twice simultaneously did not allow us to measure the effectiveness of increases in planning-preparation coping on prenatal distress or other stress measures. During the qualitative interviews that were conducted in late pregnancy (32-40 weeks), GPNC participants described important benefits in stress reduction and increased knowledge and confidence. We planned survey 2 to occur before nearly all

women gave birth so that psychosocial outcomes could be analyzed as potential mediating factors for preterm birth, but the early survey 2 timing (most women had five or more PNC visits after survey 2) suggests our results may not reflect the extent of the psychosocial benefits women realize from their PNC during pregnancy.

The quasi-experimental design and sample size of the quantitative study also pose several limitations. While I controlled for group differences in analyses, unmeasured group differences may have introduced bias. Potential bias from time-invariant factors was eliminated by the use of longitudinal change scores in some outcomes. The sample size provided limited power for effect moderation analyses. For example, among women with low initial social support who maintained their original treatment assignment, GPNC participants had 4.5 points higher postpartum maternal functioning compared to IPNC participants ($p=0.099$). A larger sample size may have indicated this difference is statistically significant. As a relatively new scale, comparisons of intervention effects using the Barkin Maternal Functioning Index as an outcome have not been published so it is open to interpretation whether this contrast is clinically significant.

In the qualitative study, women were not recruited until their second trimester and were not interviewed after every PNC visit. While our study population reflected the parity and racial characteristics of the clinic, a small number of GPNC women with children and IPNC first-time mothers were recruited. Therefore, women's early experiences with IPNC and GPNC, and differences in experiences by parity and PNC model, may not be fully reflected in this study.

Lastly, some of the same nurse practitioners provided both GPNC and IPNC. A lack of observed differences by PNC model may reflect practitioners incorporating some

educational and supportive aspects of GPNC into IPNC appointments that are not common practice in other IPNC settings.

5.4 Study Implications and Recommendations for Future Research

This study makes several contributions to the PNC literature and suggests areas for additional research. The PNC components and benefits *defined by women* in the qualitative study indicate that outcomes beyond medical and utilization measures are valuable. While women want to maximize their chances for having a healthy baby, other outcomes are important for women in PNC: reducing pregnancy-related stress; developing confidence and knowledge for improving health; readiness for labor, delivery, and infant care; and having supportive relationships. Achieving these other outcomes is particularly relevant in a healthcare system prioritizing patient-centered care and improved birth outcomes and should be part of ongoing policy development and research for women's healthcare.

The quantitative results from this study do not provide evidence that GPNC is superior to IPNC in achieving the range of outcomes described in the qualitative interviews, indicating future studies should assess self-efficacy and preparation specific to labor, birth and the postpartum period, health knowledge and behaviors, patients' engagement in their healthcare, and relationship effects. Other data collected in this study can be used to examine some additional outcomes, including smoking status, exercise frequency in pregnancy, and breastfeeding intentions, initiation, and early postpartum experiences. While I used maternal social support as a covariate and as a dichotomous moderator in analyses thus far, additional analyses of the scale items and life stressors related to women's relationships with the babies' fathers could provide some evidence of

GPNC vs. IPNC effects on these relationships. We did not measure the father's participation or attendance at IPNC or GPNC sessions, a limitation to future analyses on this topic using this data. Future research should include more comprehensive measurement of these topics.

The results from this study indicate GPNC has greater psychosocial effects for women with high levels of prenatal distress or low perceived support from family, friends, and partners in early pregnancy. Evaluating strategies for engaging and retaining at-risk women in GPNC, and analyzing global as well as subgroup treatment effects can offer providers and policy makers better information regarding target populations and expected outcomes for GPNC. Analyses for other at-risk subgroups, particularly women experiencing food insecurity or clinically significant levels of depressive symptoms, have not yet been completed using this data. Almost half of the study population reported some level of food insecurity on survey 1; the influence of food insecurity on PNC psychosocial outcomes, as well as identifying any comparative effects of GPNC to IPNC on food insecurity, are priorities for analysis and publication. Similarly, almost half of the study population reported elevated levels of depressive symptoms (i.e., scores on the CES-D of 13 or higher); examining the patterns of change in scores by PNC model and the relationship with postpartum functioning are areas for additional research using this study data.

This study used a variety of measures to assess stress and personal resources (e.g., maternal social support, life optimism) at three time points. While individual scales demonstrated high internal reliability and were used in analyses as individual measures, overlap amongst measures indicates a need for research to develop concise yet

comprehensive measurement of stress in pregnancy that is associated with birth outcomes. This will help in designing more relevant measures and in targeting and comparing the effectiveness across interventions. One promising line of research is developing a stress-to-resources ratio (Wakeel, Wisk, Gee, Chao, & Witt, 2013), which might better reflect the stress appraisal and coping processes women experience in pregnancy. Comparing changes in personal resources (e.g., social support, knowledge, self-efficacy) in relation to the amount of stress each woman experiences across PNC models may prove to be an important mediator explaining GPNC's effects on birth outcomes. Qualitative data collected in this study on women's life context, including areas of stress and support, has not yet been fully analyzed and may provide a rich source of information on changing experiences of stress and support outside PNC during pregnancy.

Among the study participants with birth outcomes data, 11.8% (27 women) had a preterm birth and 6.7% (15 women) had a low birth weight baby. In bivariate analyses, a significantly smaller proportion of GPNC participants had a preterm birth (7.6% compared to 16.4% in IPNC, p=0.039) or a low birth weight baby (2.6% compared to 11.1%, p=0.014). Women in the GPNC group had indications of greater stress (i.e., higher intimate partner violence, prenatal distress, and planning-preparation coping) at survey 1 than did IPNC women. Since stress is understood to contribute to preterm births, we might have expected the rate of preterm birth to be higher in the GNPC group than the IPNC group. The opposite was observed, suggesting that the positive benefits of participating in GNPC went beyond compensating or alleviating the higher stress in the GNPC women.

While further analyses of these outcomes incorporating the psychosocial measures is needed, robust mediation analyses examining whether differential changes in stress measures by PNC model account for birth outcomes are not possible with this small sample. About 25% of participants with preterm birth and 33% of participants with low birth weight babies did not complete survey 2, restricting the number of cases available for mediation analysis. Larger randomized studies, powered to detect differences in birth outcomes and psychosocial outcomes for at-risk groups, and incorporating process evaluation and additional data collection points, are needed to establish more conclusively GPNC biological and psychosocial outcomes for a range of participants.

5.5 Conclusion

Providing medical care in group settings is gaining attention in medicine, particularly the management of chronic diseases, and has demonstrated increased patient and provider satisfaction, improved health outcomes, and reduced costs (Jaber, et al., 2006). This study contributes to the existing PNC literature that GPNC confers additional educational and psychosocial benefits compared to IPNC, particularly among women with psychosocial risk factors, and efforts to increase the availability of high-quality GPNC can provide interested women with choices in PNC. This study also provides direction for changing how IPNC is delivered. Refocusing and retraining providers on the value of building positive relationships with pregnant women, providing supportive reassurance, making individualized assessments of risks and educational needs, and covering health promotion topics can better align IPNC with women's needs and with the

aims of PNC set forth by the US Public Health Service (United States Public Health Service, 1989).

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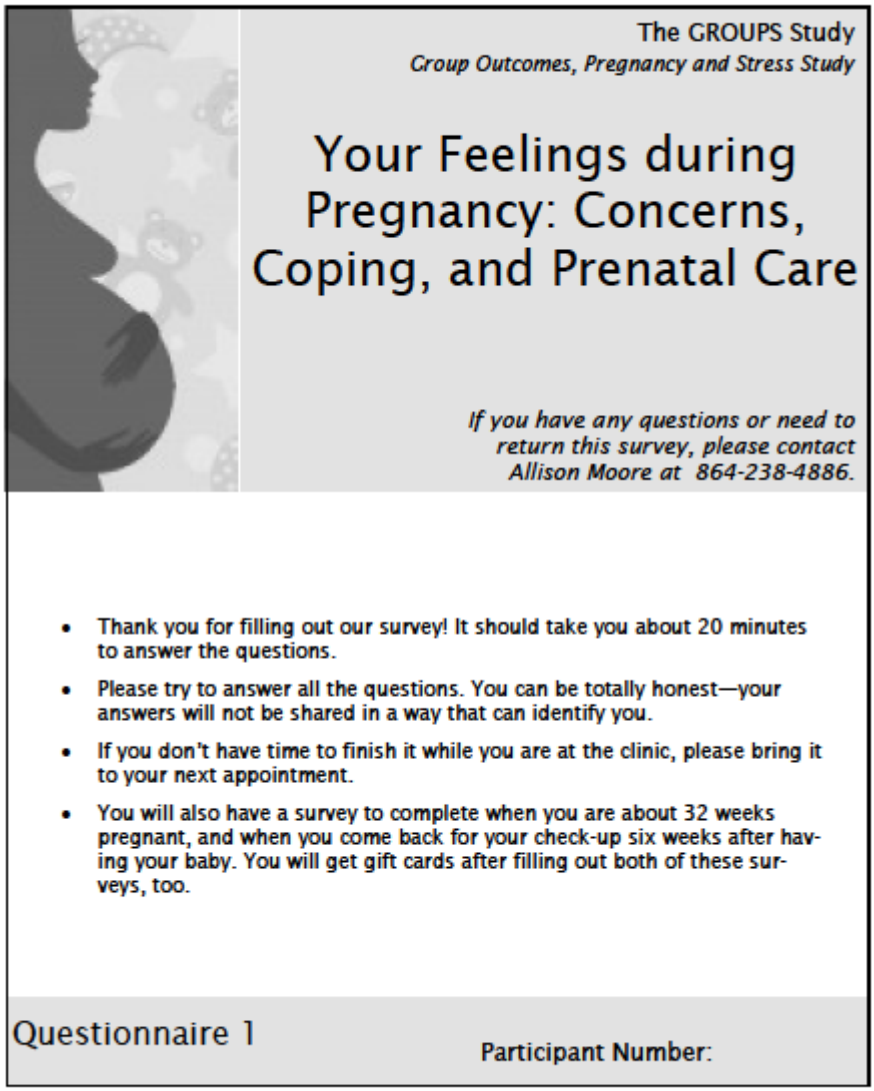
APPENDIX A: SURVEY 1



The GROUPS Study

Group Outcomes, Pregnancy and Stress Study

Your Feelings during Pregnancy: Concerns, Coping, and Prenatal Care

If you have any questions or need to return this survey, please contact Allison Moore at 864-238-4886.

- Thank you for filling out our survey! It should take you about 20 minutes to answer the questions.
- Please try to answer all the questions. You can be totally honest—your answers will not be shared in a way that can identify you.
- If you don't have time to finish it while you are at the clinic, please bring it to your next appointment.
- You will also have a survey to complete when you are about 32 weeks pregnant, and when you come back for your check-up six weeks after having your baby. You will get gift cards after filling out both of these surveys, too.

Questionnaire 1

Participant Number:

INSTRUCTIONS *To some women, certain things about being pregnant are uncomfortable or upsetting, but other women may not be bothered by the same things. We are interested in the things that worry or bother you now.*

Are you feeling bothered, upset, or worried at this point in your pregnancy...

	Not at all	Some-what	Very Much
1) ...about taking care of a newborn baby?	0	1	2
2) ...about the effect of ongoing health problems such as high blood pressure or diabetes on your pregnancy?	0	1	2
3) ...about feeling tired and having low energy during your pregnancy?	0	1	2
4) ...about pain during labor and delivery?	0	1	2
5) ...about paying for your medical care during pregnancy?	0	1	2
6) ...about changes in your weight and body shape during pregnancy?	0	1	2
7) ...about whether the baby might come too early?	0	1	2
8) ...about physical symptoms of pregnancy, such as vomiting, swollen feet, or backaches?	0	1	2
9) ...about the quality of your medical care during pregnancy?	0	1	2
10) ...about changes in your relationships with other people due to having a baby?	0	1	2
11) ...about whether you might have an unhealthy baby?	0	1	2
12) ...about what will happen during labor and delivery?	0	1	2
13) ... about working or caring for your family during your pregnancy?	0	1	2
14) ...about paying for the baby's clothes, food, or medical care?	0	1	2
15) ... about working at a job after the baby comes?	0	1	2
16) ...about getting day care, babysitters, or other help to watch the baby after it comes?	0	1	2
17) ...about whether the baby might be affected by alcohol, cigarettes, or drugs that you have taken?	0	1	2

Instructions are continued from page 2...

18) Are there other things that you are bothered, upset, or worried about that have to do with your pregnancy, the birth, or the baby?	NO	YES
IF YES: What things are you bothered, upset, or worried about?		

INSTRUCTIONS *This set of questions asks you to think about how you have been feeling in the past month. Please circle the number that best fits how you feel about each question.*

In the LAST MONTH...	Never	Almost Never	Some-times	Fairly Often	Very Often
1) How often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2) How often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3) How often have you felt nervous and "stressed"?	0	1	2	3	4
4) How often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
5) How often have you felt that things were going your way?	0	1	2	3	4
6) How often have you found that you could not cope with all the things that you had to do?	0	1	2	3	4
7) How often have you been able to control irritations in your life?	0	1	2	3	4
8) How often have you felt that you were on top of things?	0	1	2	3	4
9) How often have you been angered because of things that were outside of your control?	0	1	2	3	4
10) How often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

INSTRUCTIONS

Below is a list of things that pregnant women sometimes do to try to manage the strains and challenges of being pregnant. Sometimes our attempts to manage a stressful situation or to feel better are successful, but at other times they are not. For each item, please circle how often you have tried it over the last month as a way of managing the strains and challenges of being pregnant, even if it wasn't successful.

In the LAST MONTH, how often have you done each of these things to try to manage the strains and challenges of being pregnant?	Never	Almost Never	Some-times	Fairly Often	Very Often
1) Imagined how the birth will go?	0	1	2	3	4
2) Talked to people about what it is like to raise a child?	0	1	2	3	4
3) Compared yourself to women having a more difficult pregnancy?	0	1	2	3	4
4) Taken out your frustrations on other people?	0	1	2	3	4
5) Asked doctors or nurses about the birth?	0	1	2	3	4
6) Read from the bible or a book of prayers?	0	1	2	3	4
7) Tried to keep your feelings about being pregnant to yourself?	0	1	2	3	4
8) Reminded yourself that you've been through worse times?	0	1	2	3	4
9) Tried to focus on what is important in life?	0	1	2	3	4
10) Slept in order to escape problems?	0	1	2	3	4
11) Thought about what it will be like after the baby comes?	0	1	2	3	4
12) Planned how you will handle the birth?	0	1	2	3	4
13) Spent time or talked with someone who just had a baby?	0	1	2	3	4
14) Made plans to get baby clothes or supplies?	0	1	2	3	4
15) Tried to focus on the positive parts of your pregnancy rather than the negative parts?	0	1	2	3	4
16) Prayed for strength or courage to get through your pregnancy?	0	1	2	3	4
17) Gotten advice and understanding from someone about your pregnancy?	0	1	2	3	4
If so, from who?					
18) Tried not to think about the birth?	0	1	2	3	4

Instructions are continued from page 4...

How often in the LAST MONTH have you...	Never	Almost Never	Some-times	Fairly Often	Very Often
19) Spent time with other pregnant women or talked with them?	0	1	2	3	4
20) Told yourself that things could be worse?	0	1	2	3	4
21) Had an alcoholic drink to feel better?	0	1	2	3	4
22) Felt lucky to be a woman and be able to experience pregnancy?	0	1	2	3	4
23) Planned how you or someone else will take care of the baby?	0	1	2	3	4
24) Imagined or pretended being the mother of a newborn?	0	1	2	3	4
25) Tried to avoid reading or hearing stories about childbirth?	0	1	2	3	4
26) Wished that the birth was over already?	0	1	2	3	4
27) Tried to make yourself feel better with food?	0	1	2	3	4
28) Planned changes in the number of hours that you work, or in things that you do at work?	0	1	2	3	4
29) Smoked a cigarette to feel better?	0	1	2	3	4
30) Thought about pregnant women who are doing better than you?	0	1	2	3	4
31) Tried to stay away from other people?	0	1	2	3	4
32) Gone for a walk or gotten some exercise to feel better?	0	1	2	3	4
33) Prayed that the birth will go well?	0	1	2	3	4
34) Talked to family or friends about what it is like to give birth?	0	1	2	3	4
35) Felt that being pregnant has made your life better?	0	1	2	3	4
36) Prayed that the baby will be healthy?	0	1	2	3	4
37) Wished that you weren't pregnant?	0	1	2	3	4
38) Tried to keep your feelings about the pregnancy from interfering with things you had to do?	0	1	2	3	4
39) Felt that having a baby was fulfilling a lifetime dream or goal?	0	1	2	3	4
40) Used a drug to feel better?	0	1	2	3	4
41) Gone to church, synagogue, a mosque, or other place to pray?	0	1	2	3	4
42) Read or watched something about childbirth that told what it would be like?	0	1	2	3	4

INSTRUCTIONS *This question is about exercise in the last month. Please circle the choice that best matches your experience in the LAST MONTH.*

1) In the past month, how many days a week did you get at least 30 minutes of physical activity or exercise? (For example, walking, dancing, swimming, yard work, or sweeping.) Check one answer.

- ☐ Less than 1 day per week
- ☐ 1 to 4 days per week
- ☐ 5 or more days per week
- ☐ I was told by a doctor, nurse, or other health care worker not to exercise

INSTRUCTIONS *The next five questions ask about the food eaten in your household in the LAST MONTH. Read each item and then pick the choice that best matches your experience.*

1) The food that you bought just didn't last, and you didn't have money to get more. Was this often, sometimes, or never true for you or your household in the last month?

- ☐ Often true
- ☐ Sometimes true
- ☐ Never true

2) You couldn't afford to eat the healthy foods that you wanted to. Was this often, sometimes, or never true for you or your household in the last month?

- ☐ Often true
- ☐ Sometimes true
- ☐ Never true

3) In the last month, did you ever cut the size of your meals or skip meals because there wasn't enough money for food?

☐ Yes ☐ No

4) In the last month, did you ever eat less than you felt you should because there wasn't enough money for food?

☐ Yes ☐ No

5) In the last month, were you ever hungry but didn't eat because there wasn't enough money for food?

☐ Yes ☐ No

INSTRUCTIONS *This set of questions asks you about how you have been feeling in the PAST WEEK. Please circle the number that best fits how you feel about each question:*

- Rarely or none of the time (less than 1 day)
- Some or a little of the time (1-2 days)
- Occasionally or a moderate amount of time (3-4 days)
- Most or all of the time (5-7 days)

How often have you felt this way in the LAST WEEK?				
	Less than 1 day (rarely)	1-2 days (Some or a little)	3-4 days (Occasionally)	5-7 days (Most or all of the time)
1) I felt that I could not shake off the blues even with help from my family or friends.	<1	1-2	3-4	5-7
2) I felt that I was just as good as other people.	<1	1-2	3-4	5-7
3) I had trouble keeping my mind on what I was doing.	<1	1-2	3-4	5-7
4) I felt depressed.	<1	1-2	3-4	5-7
5) I felt hopeful about the future.	<1	1-2	3-4	5-7
6) I thought my life had been a failure.	<1	1-2	3-4	5-7
7) I felt fearful.	<1	1-2	3-4	5-7
8) I was happy.	<1	1-2	3-4	5-7
9) I talked less than usual.	<1	1-2	3-4	5-7
10) I felt lonely.	<1	1-2	3-4	5-7
11) People were unfriendly.	<1	1-2	3-4	5-7
12) I enjoyed life.	<1	1-2	3-4	5-7
13) I had crying spells.	<1	1-2	3-4	5-7
14) I felt sad.	<1	1-2	3-4	5-7
15) I felt that people dislike me.	<1	1-2	3-4	5-7

INSTRUCTIONS *This is a list of words that describe different feelings and emotions. Read each word and pick the number that matches how much you have felt this way in the PAST WEEK.*

How often have you felt this way in the LAST WEEK?					
	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
1) Interested	0	1	2	3	4
2) Distressed	0	1	2	3	4
3) Excited	0	1	2	3	4
4) Upset	0	1	2	3	4
5) Strong	0	1	2	3	4
6) Guilty	0	1	2	3	4
7) Scared	0	1	2	3	4
8) Hostile	0	1	2	3	4
9) Enthusiastic	0	1	2	3	4
10) Proud	0	1	2	3	4
11) Irritable	0	1	2	3	4
12) Alert	0	1	2	3	4
13) Ashamed	0	1	2	3	4
14) Inspired	0	1	2	3	4
15) Nervous	0	1	2	3	4
16) Determined	0	1	2	3	4
17) Attentive	0	1	2	3	4
18) Jittery (or restless)	0	1	2	3	4
19) Active	0	1	2	3	4
20) Afraid	0	1	2	3	4

INSTRUCTIONS

The next ten questions ask about how you usually feel. Please be as honest and accurate as you can throughout. Try not to let your response to one statement influence your responses to other statements. There are no 'correct' or 'incorrect' answers. Answer according to your own feelings, rather than how you think most people would answer.

	I disagree a lot	I disagree a little	I neither agree nor disagree	I agree a little	I agree a lot
1) In uncertain times, I usually expect the best.	0	1	2	3	4
2) It's easy for me to relax.	0	1	2	3	4
3) If something can go wrong for me, it will.	0	1	2	3	4
4) I'm always optimistic about my future.	0	1	2	3	4
5) I enjoy my friends a lot.	0	1	2	3	4
6) It's important for me to keep busy.	0	1	2	3	4
7) I hardly ever expect things to go my way.	0	1	2	3	4
8) I don't get upset too easily.	0	1	2	3	4
9) I rarely count on good things happening to me.	0	1	2	3	4
10) Overall, I expect more good things to happen to me than bad.	0	1	2	3	4

INSTRUCTIONS

For each of the following statements, please circle the number which shows how you feel about the support you have RIGHT NOW.

	Never	Rarely	Some of the time	Most of the time	Always
1) I have good friends who support me.	0	1	2	3	4
2) My family is always there for me.	0	1	2	3	4
3) My husband/partner/boyfriend helps me a lot.	0	1	2	3	4
4) There is conflict with my husband/partner/boyfriend.	0	1	2	3	4
5) I feel controlled by my husband/partner/boyfriend.	0	1	2	3	4
6) I feel loved by my husband/partner/boyfriend.	0	1	2	3	4

INSTRUCTIONS *This question is about things that may have happened during the* LAST 12 MONTHS. *For each item, circle Y (Yes) if it happened to you or circle N (No) if it did not.*

In the last 12 months...

1) A close family member was very sick and had to go into the hospital.	Y	N
2) I got separated or divorced from my husband or partner.	Y	N
3) I moved to a new address.	Y	N
4) I was homeless.	Y	N
5) My husband or partner lost his job.	Y	N
6) I lost my job even though I wanted to go on working.	Y	N
7) I argued with my husband or partner more than usual.	Y	N
8) My husband or partner said he didn't want me to be pregnant.	Y	N
9) I had a lot of bills I couldn't pay.	Y	N
10) I was in a physical fight.	Y	N
11) My husband or partner or I went to jail.	Y	N
12) Someone very close to me had a problem with drinking or drugs.	Y	N
13) Someone very close to me died.	Y	N
14) I felt emotionally upset (for example, angry, sad, or frustrated) as a result of how I was treated based on my race.	Y	N

INSTRUCTIONS *The next questions ask about your relationship with your husband, partner, or boyfriend in the last year and since you found out you were pregnant. Read each item and then circle Y (Yes) if you experienced each item in the last 12 months or since becoming pregnant. Circle N (No) if you did not experience each item in the last 12 months or since becoming pregnant.*

	In the last 12 months	Since becoming pregnant
1) Your husband, partner, or boyfriend threatened you or made you feel unsafe in some way.	Y N	Y N
2) You were frightened for the safety of yourself or your family because of the anger or threats of your husband, partner, or boyfriend.	Y N	Y N
3) Your husband, partner, or boyfriend tried to control your daily activities, for example, controlling who you could talk to or where you could go.	Y N	Y N
4) Your husband, partner, or boyfriend forced you to take part in touching or any sexual activity you did not want to.	Y N	Y N
5) Your husband, partner, or boyfriend pushed, hit, slapped, kicked, choked, or physically hurt you in any way.	Y N	Y N

INSTRUCTIONS *The next two questions ask about planning your pregnancy. Read each item and then pick the choice that best matches your experience.*

1) When you got pregnant with your new baby, were you trying to get pregnant?

- ☐ No
- ☐ Yes

2) How did you feel when you found out you were pregnant?

- ☐ Very unhappy
- ☐ Somewhat unhappy
- ☐ Somewhat happy
- ☐ Very happy
- ☐ I wasn't sure how I felt

INSTRUCTIONS *The next question asks about your plans for breastfeeding. Select the answer that best matches your plans.*

1) What are your plans for breastfeeding your new baby? Check one answer.

- ☐ I know I will breastfeed
- ☐ I think I might breastfeed
- ☐ I know I will not breastfeed
- ☐ I don't know what to do about breastfeeding

INSTRUCTIONS *The next three questions ask about smoking, alcohol use, and drug use. Remember that all your answers are confidential. Read each item and then pick the choice that best matches your experience.*

1) How many cigarettes do you smoke on an average day *now*? (A pack has 20 cigarettes.)

- ☐ 41 cigarettes or more
- ☐ 21 to 40 cigarettes
- ☐ 11 to 20 cigarettes
- ☐ 6 to 10 cigarettes
- ☐ 1 to 5 cigarettes
- ☐ Less than 1 cigarette
- ☐ I don't smoke now

2) In the last month, how many alcoholic drinks have you had in an average week?

- ☐ 14 drinks or more a week
- ☐ 7 to 13 drinks a week
- ☐ 4 to 6 drinks a week
- ☐ 1 to 3 drinks a week
- ☐ Less than 1 drink a week
- ☐ I don't drink alcohol

3) In the last month, have you used any of these drugs? For each item, circle Y (Yes) if you used it or circle N (No) if you did not.

Prescription drugs	Y	N
If yes, write what kinds: _____		
Marijuana (pot, bud, trees) or hashish (hash)	Y	N
Amphetamines (crystal meth, crank, uppers, ice, speed)	Y	N
Cocaine (rock, coke, crack) or heroin (smack, horse)	Y	N
Tranquilizers (downers) or hallucinogens (LSD/acid, PCP/angel dust, ecstasy)	Y	N

INSTRUCTIONS *The last set of questions asks for some information about you. This information will not be used in billing for services and will not affect any services you are now getting.*

1) What is your date of birth?

Month	Day	Year

2) How many children do you have?

- ☐ This baby will be my first child
- ☐ I have one other child
- ☐ I have two other children
- ☐ I have three or more other children

3) What is your race (check all that apply)?

- ☐ White
- ☐ Black or African American
- ☐ Other: _____

4) Are you of Hispanic, Latino or Spanish origin?

- ☐ No, not of Hispanic, Latino, or Spanish origin
- ☐ Yes, Mexican, Mexican American
- ☐ Yes, Puerto Rican
- ☐ Yes, Cuban
- ☐ Yes, another Hispanic, Latino, or Spanish origin

5) What language do you usually speak at home? Check one answer.

- ☐ English
- ☐ Spanish
- ☐ Other

6) Were you born outside the United States?

- ☐ No
- ☐ Yes

7) IF yes, how old were you when you moved to the United States?

_____Age in years

8) During the last 12 months, what was your yearly total household income before taxes? Include your income, your husband's or partner's income, and any other income you may have received.

- ☐ Less than $10,000
- ☐ $10,000 to $14,999
- ☐ $15,000 to $19,999
- ☐ $20,000 to $24,999
- ☐ $25,000 to $34,999
- ☐ $35,000 to $49,999
- ☐ $50,000 or more

9) During the last 12 months , how many people, including yourself, depended on this income?

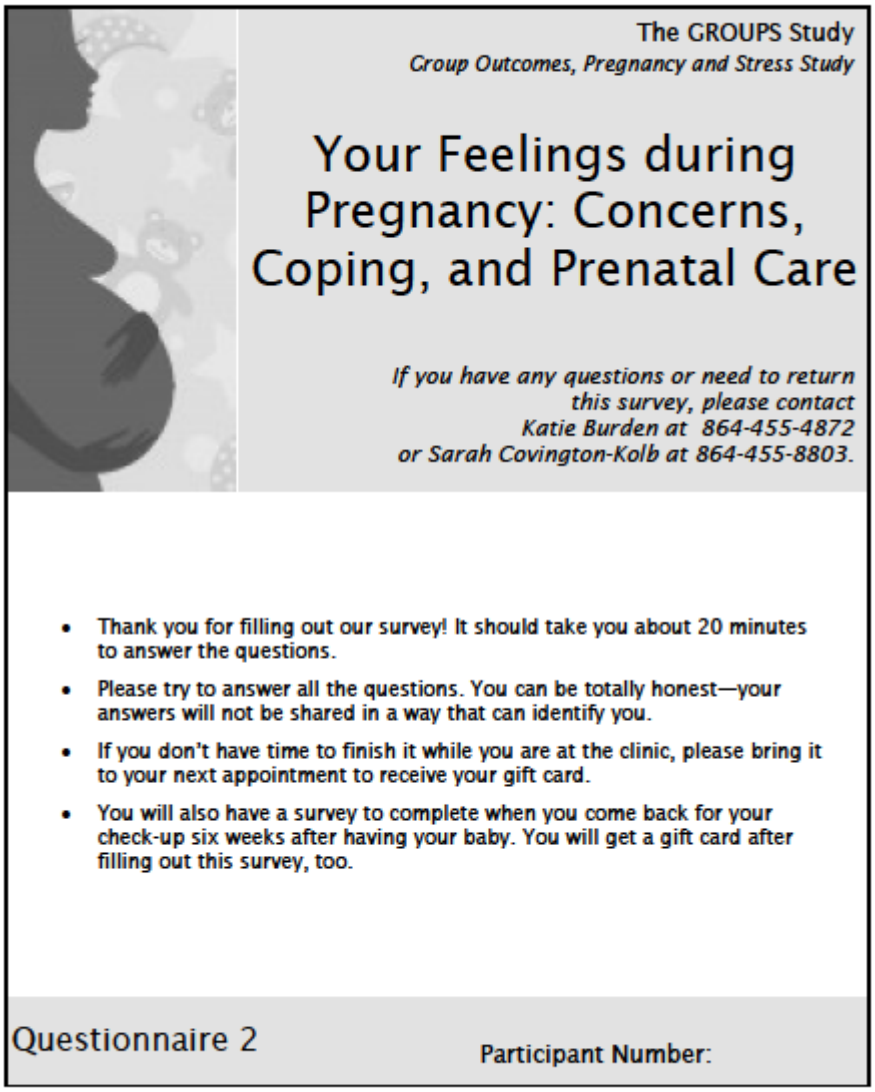
_____People

10) What is the highest degree or level of school you have COMPLETED?

- ☐ No schooling completed
- ☐ Nursery school to 5th grade
- ☐ 6th grade to 8th grade
- ☐ 9th grade to 11th grade
- ☐ 12th grade, no diploma
- ☐ High school graduation
- ☐ Some college credit
- ☐ Associate's degree
- ☐ Bachelor's degree
- ☐ Graduate or professional degree

PLEASE SHARE YOUR COMMENTS!

APPENDIX B: SURVEY 2



The GROUPS Study

Group Outcomes, Pregnancy and Stress Study

Your Feelings during Pregnancy: Concerns, Coping, and Prenatal Care

If you have any questions or need to return this survey, please contact Katie Burden at 864-455-4872 or Sarah Covington-Kolb at 864-455-8803.

- Thank you for filling out our survey! It should take you about 20 minutes to answer the questions.
- Please try to answer all the questions. You can be totally honest—your answers will not be shared in a way that can identify you.
- If you don't have time to finish it while you are at the clinic, please bring it to your next appointment to receive your gift card.
- You will also have a survey to complete when you come back for your check-up six weeks after having your baby. You will get a gift card after filling out this survey, too.

Questionnaire 2

Participant Number:

INSTRUCTIONS *To some women, certain things about being pregnant are uncomfortable or upsetting, but other women may not be bothered by the same things. We are interested in the things that worry or bother you now.*

Are you feeling bothered, upset, or worried at this point in your pregnancy...	Not at all	Somewhat	Very Much
1) ...about taking care of a newborn baby?	0	1	2
2) ...about the effect of ongoing health problems such as high blood pressure or diabetes on your pregnancy?	0	1	2
3) ...about feeling tired and having low energy during your pregnancy?	0	1	2
4) ...about pain during labor and delivery?	0	1	2
5) ...about paying for your medical care during pregnancy?	0	1	2
6) ...about changes in your weight and body shape during pregnancy?	0	1	2
7) ...about whether the baby might come too early?	0	1	2
8) ...about physical symptoms of pregnancy, such as vomiting, swollen feet, or backaches?	0	1	2
9) ...about the quality of your medical care during pregnancy?	0	1	2
10) ...about changes in your relationships with other people due to having a baby?	0	1	2
11) ...about whether you might have an unhealthy baby?	0	1	2
12) ...about what will happen during labor and delivery?	0	1	2
13) ... about working or caring for your family during your pregnancy?	0	1	2
14) ...about paying for the baby's clothes, food, or medical care?	0	1	2
15) ... about working at a job after the baby comes?	0	1	2
16) ...about getting day care, babysitters, or other help to watch the baby after it comes?	0	1	2
17) ...about whether the baby might be affected by alcohol, cigarettes, or drugs that you have taken?	0	1	2
18) Are there other things that you are bothered, upset, or worried about that have to do with your pregnancy, the birth, or the baby?	NO		YES
IF YES: What things are you bothered, upset, or worried about?			

INSTRUCTIONS *This set of questions asks you to think about how you have been feeling in the past month. Please circle the number that best fits how you feel about each question.*

In the LAST MONTH...	Never	Almost Never	Some-times	Fairly Often	Very Often
1) How often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2) How often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3) How often have you felt nervous and "stressed"?	0	1	2	3	4
4) How often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
5) How often have you felt that things were going your way?	0	1	2	3	4
6) How often have you found that you could not cope with all the things that you had to do?	0	1	2	3	4
7) How often have you been able to control irritations in your life?	0	1	2	3	4
8) How often have you felt that you were on top of things?	0	1	2	3	4
9) How often have you been angered because of things that were outside of your control?	0	1	2	3	4
10) How often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

INSTRUCTIONS *The next five questions ask about the food eaten in your household in the LAST MONTH. Read each item and then pick the choice that best matches your experience.*

1) The food that you bought just didn't last, and you didn't have money to get more. Was this often, sometimes, or never true for you or your household in the last month?

☐ Often true ☐ Sometimes true

☐ Never true

2) You couldn't afford to eat the healthy foods that you wanted to. Was this often, sometimes, or never true for you or your household in the last month?

☐ Often true ☐ Sometimes true

☐ Never true

3) In the last month, did you ever cut the size of your meals or skip meals because there wasn't enough money for food?

☐ Yes ☐ No

4) In the last month, did you ever eat less than you felt you should because there wasn't enough money for food?

☐ Yes ☐ No

5) In the last month, were you ever hungry but didn't eat because there wasn't enough money for food?

☐ Yes ☐ No

INSTRUCTIONS

Below is a list of things that pregnant women sometimes do to try to manage the strains and challenges of being pregnant. Sometimes our attempts to manage a stressful situation or to feel better are successful, but at other times they are not. For each item, please circle how often you have tried it over the last month as a way of managing the strains and challenges of being pregnant, even if it wasn't successful.

In the LAST MONTH, how often have you done each of these things to try to manage the strains and challenges of being pregnant?

	Never	Almost Never	Some-times	Fairly Often	Very Often
1) Imagined how the birth will go?	0	1	2	3	4
2) Talked to people about what it is like to raise a child?	0	1	2	3	4
3) Compared yourself to women having a more difficult pregnancy?	0	1	2	3	4
4) Taken out your frustrations on other people?	0	1	2	3	4
5) Asked doctors or nurses about the birth?	0	1	2	3	4
6) Read from the bible or a book of prayers?	0	1	2	3	4
7) Tried to keep your feelings about being pregnant to yourself?	0	1	2	3	4
8) Reminded yourself that you've been through worse times?	0	1	2	3	4
9) Tried to focus on what is important in life?	0	1	2	3	4
10) Slept in order to escape problems?	0	1	2	3	4
11) Thought about what it will be like after the baby comes?	0	1	2	3	4
12) Planned how you will handle the birth?	0	1	2	3	4
13) Spent time or talked with someone who just had a baby?	0	1	2	3	4
14) Made plans to get baby clothes or supplies?	0	1	2	3	4
15) Tried to focus on the positive parts of your pregnancy rather than the negative parts?	0	1	2	3	4
16) Prayed for strength or courage to get through your pregnancy?	0	1	2	3	4
17) Gotten advice and understanding from someone about your pregnancy?	0	1	2	3	4
If so, from who?					
18) Tried not to think about the birth?	0	1	2	3	4

Instructions are continued from page 4...

How often in the LAST MONTH have you...	Never	Almost Never	Some-times	Fairly Often	Very Often
19) Spent time with other pregnant women or talked with them?	0	1	2	3	4
20) Told yourself that things could be worse?	0	1	2	3	4
21) Had an alcoholic drink to feel better?	0	1	2	3	4
22) Felt lucky to be a woman and be able to experience pregnancy?	0	1	2	3	4
23) Planned how you or someone else will take care of the baby?	0	1	2	3	4
24) Imagined or pretended being the mother of a newborn?	0	1	2	3	4
25) Tried to avoid reading or hearing stories about childbirth?	0	1	2	3	4
26) Wished that the birth was over already?	0	1	2	3	4
27) Tried to make yourself feel better with food?	0	1	2	3	4
28) Planned changes in the number of hours that you work, or in things that you do at work?	0	1	2	3	4
29) Smoked a cigarette to feel better?	0	1	2	3	4
30) Thought about pregnant women who are doing better than you?	0	1	2	3	4
31) Tried to stay away from other people?	0	1	2	3	4
32) Gone for a walk or gotten some exercise to feel better?	0	1	2	3	4
33) Prayed that the birth will go well?	0	1	2	3	4
34) Talked to family or friends about what it is like to give birth?	0	1	2	3	4
35) Felt that being pregnant has made your life better?	0	1	2	3	4
36) Prayed that the baby will be healthy?	0	1	2	3	4
37) Wished that you weren't pregnant?	0	1	2	3	4
38) Tried to keep your feelings about the pregnancy from interfering with things you had to do?	0	1	2	3	4
39) Felt that having a baby was fulfilling a lifetime dream or goal?	0	1	2	3	4
40) Used a drug to feel better?	0	1	2	3	4
41) Gone to church, synagogue, a mosque, or other place to pray?	0	1	2	3	4
42) Read or watched something about childbirth that told what it would be like?	0	1	2	3	4

INSTRUCTIONS *For each of the following statements, please circle the number which shows how you feel about the support you have RIGHT NOW.*

	Never	Rarely	Some of the time	Most of the time	Always
1) I have good friends who support me.	0	1	2	3	4
2) My family is always there for me.	0	1	2	3	4
3) My husband/partner/boyfriend helps me a lot.	0	1	2	3	4
4) There is conflict with my husband/partner/boyfriend.	0	1	2	3	4
5) I feel controlled by my husband/partner/boyfriend.	0	1	2	3	4
6) I feel loved by my husband/partner/boyfriend.	0	1	2	3	4

INSTRUCTIONS *This set of questions asks you about how you have been feeling in the PAST WEEK. Please circle the number that best fits how you feel about each question.*

In the LAST WEEK...	Less than 1 day (rarely or never)	1-2 days (Some or a little)	3-4 days (Occasionally)	5-7 days (Most or all of the time)
1) I felt that I could not shake off the blues even with help from my family or friends.	<1	1-2	3-4	5-7
2) I felt that I was just as good as other people.	<1	1-2	3-4	5-7
3) I had trouble keeping my mind on what I was doing.	<1	1-2	3-4	5-7
4) I felt depressed.	<1	1-2	3-4	5-7
5) I felt hopeful about the future.	<1	1-2	3-4	5-7
6) I thought my life had been a failure.	<1	1-2	3-4	5-7
7) I felt fearful.	<1	1-2	3-4	5-7
8) I was happy.	<1	1-2	3-4	5-7
9) I talked less than usual.	<1	1-2	3-4	5-7
10) I felt lonely.	<1	1-2	3-4	5-7
11) People were unfriendly.	<1	1-2	3-4	5-7
12) I enjoyed life.	<1	1-2	3-4	5-7
13) I had crying spells.	<1	1-2	3-4	5-7
14) I felt sad.	<1	1-2	3-4	5-7
15) I felt that people dislike me.	<1	1-2	3-4	5-7

INSTRUCTIONS *This is a list of words that describe different feelings and emotions. Read each word and pick the number that matches how much you have felt this way in the PAST WEEK.*

How often have you felt this way in the LAST WEEK?					
	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
1) Interested	0	1	2	3	4
2) Distressed	0	1	2	3	4
3) Excited	0	1	2	3	4
4) Upset	0	1	2	3	4
5) Strong	0	1	2	3	4
6) Guilty	0	1	2	3	4
7) Scared	0	1	2	3	4
8) Hostile	0	1	2	3	4
9) Enthusiastic	0	1	2	3	4
10) Proud	0	1	2	3	4
11) Irritable	0	1	2	3	4
12) Alert	0	1	2	3	4
13) Ashamed	0	1	2	3	4
14) Inspired	0	1	2	3	4
15) Nervous	0	1	2	3	4
16) Determined	0	1	2	3	4
17) Attentive	0	1	2	3	4
18) Jittery (or restless)	0	1	2	3	4
19) Active	0	1	2	3	4
20) Afraid	0	1	2	3	4

INSTRUCTIONS *The next ten questions ask about how you usually feel. Please be as honest and accurate as you can throughout. Try not to let your response to one statement influence your responses to other statements. There are no 'correct' or 'incorrect' answers. Answer according to your own feelings, rather than how you think most people would answer.*

	I disagree a lot	I disagree a little	I neither agree nor disagree	I agree a little	I agree a lot
1) In uncertain times, I usually expect the best.	0	1	2	3	4
2) It's easy for me to relax.	0	1	2	3	4
3) If something can go wrong for me, it will.	0	1	2	3	4
4) I'm always optimistic about my future.	0	1	2	3	4
5) I enjoy my friends a lot.	0	1	2	3	4
6) It's important for me to keep busy.	0	1	2	3	4
7) I hardly ever expect things to go my way.	0	1	2	3	4
8) I don't get upset too easily.	0	1	2	3	4
9) I rarely count on good things happening to me.	0	1	2	3	4
10) Overall, I expect more good things to happen to me than bad.	0	1	2	3	4

INSTRUCTIONS *Please read each statement and then choose the response that best describes how you feel. "Health care provider" refers to your midwife, doctor, nurse practitioner, or other prenatal care provider.*

	Strongly disagree	Disagree	Agree	Strongly agree
1) I can ask my health care provider about my pregnancy.	0	1	2	3
2) I have enough time with my health care provider to discuss my pregnancy.	0	1	2	3
3) My health care provider listens to me.	0	1	2	3
4) My health care provider respects me.	0	1	2	3
5) I expect my health care provider to respect my decisions about my pregnancy.	0	1	2	3
6) My health care provider respects my decisions, even if they are different from her/his recommendation.	0	1	2	3

Instructions are continued from page 8...	Strongly disagree	Disagree	Agree	Strongly agree
7) I take responsibility for the decisions that I make about my pregnancy, like eating healthy food.	0	1	2	3
8) I prefer to have my health care provider make my health care decisions for me.	0	1	2	3
9) I prefer to make health care decisions with help from my health care provider.	0	1	2	3
10) I can tell when I have made a good health choice.	0	1	2	3
11) Since I began prenatal care, I have been making more decisions about my health.	0	1	2	3
12) Women need to share experiences with other women when they are pregnant.	0	1	2	3
13) I share my feelings and experiences with other women.	0	1	2	3
14) I know if I am gaining the right amount of weight during my pregnancy.	0	1	2	3
15) I have a right to ask questions when I don't understand something about my pregnancy.	0	1	2	3
16) I am able to change things in my life that are not healthy for me.	0	1	2	3
17) I am doing what I can to have a healthy baby.	0	1	2	3
18) If something is going wrong in my pregnancy, I know who to talk to.	0	1	2	3
Please answer questions 19-23 based on your experience with the Centering groups. If you are no longer going to Centering, please answer the questions based on your experience with Centering. Skip these questions and go to the breastfeeding question at the bottom of the page if you did not attend any Centering groups.				
19) I have enough personal attention from my health care provider in groups to meet my needs.	0	1	2	3
20) Women in the group listen to me.	0	1	2	3
21) Taking my own blood pressure helps me to know if my blood pressure is normal.	0	1	2	3
22) When I weigh myself I know if I am gaining the right amount of weight during my pregnancy.	0	1	2	3
23) Using the self-assessment sheets during group helped me understand my pregnancy.	0	1	2	3

INSTRUCTIONS

What are your plans for breastfeeding your new baby? Check one answer.

- ☐ I know I will breastfeed
- ☐ I think I might breastfeed
- ☐ I know I will NOT breastfeed
- ☐ I don't know what to do about breastfeeding

INSTRUCTIONS *Please answer these questions about your experience with Centering. If you are no longer going to Centering, please answer the questions based on your experience with Centering.*
SKIP PAGE 10 AND GO TO PAGE 11 IF YOU DID NOT ATTEND ANY GROUPS.

	Strongly disagree	Somewhat disagree	Neither agree or disagree	Some-what agree	Strongly agree
1) I want to remain a member of this group.	0	1	2	3	4
2) I like my group.	0	1	2	3	4
3) I look forward to coming to the group.	0	1	2	3	4
4) I don't care what happens in this group.	0	1	2	3	4
5) I feel involved in what is happening in my group.	0	1	2	3	4
6) If I could drop out of the group now, I would.	0	1	2	3	4
7) I dread coming to this group.	0	1	2	3	4
8) I wish it were possible for the group to end now.	0	1	2	3	4
9) I am dissatisfied with the group.	0	1	2	3	4
10) If it were possible to move to another group at this time, I would.	0	1	2	3	4
11) I feel included in the group.	0	1	2	3	4
12) In spite of individual differences, a feeling of unity exists in my group.	0	1	2	3	4
13) I do not feel like I am a part of the group's activities.	0	1	2	3	4
14) I feel it would make a difference to the group if I were not here.	0	1	2	3	4
15) If I were told my group would not meet today, I would feel badly.	0	1	2	3	4
16) I feel distant from the group.	0	1	2	3	4
17) It makes a difference to me how this group turns out.	0	1	2	3	4
18) I feel my absence would not matter to the group.	0	1	2	3	4
19) I would not feel badly if I had to miss a meeting of this group.	0	1	2	3	4

If you attended Centering and then decided to return to individual prenatal care, please share why:

INSTRUCTIONS *The next questions ask about your relationship with your husband, partner, or boyfriend in the last three months. Read each item and then circle Y (Yes) if you experienced each item in the last 3 months. Circle N (No) if you did not experience each item in the last 3 months.*

In the last 3 months...		
1) Your husband, partner, or boyfriend threatened you or made you feel unsafe in some way.	Y	N
2) You were frightened for the safety of yourself or your family because of the anger or threats of your husband, partner, or boyfriend.	Y	N
3) Your husband, partner, or boyfriend tried to control your daily activities, for example, controlling who you could talk to or where you could go.	Y	N
4) Your husband, partner, or boyfriend forced you to take part in touching or any sexual activity you did not want to.	Y	N
5) Your husband, partner, or boyfriend pushed, hit, slapped, kicked, choked, or physically hurt you in any way.	Y	N

INSTRUCTIONS *This question is about things that may have happened during the* LAST 3 MONTHS. *Circle N/A (not applicable) if you did not experience an event in the last three months. Circle how stressful you found each event you did experience.*

In the last 3 months...	Didn't happen to me	Not stressful	Somewhat stressful	Very stressful
1) A close family member was very sick and had to go into the hospital.	N/A	0	1	2
2) I got separated or divorced from my husband or partner.	N/A	0	1	2
3) I moved to a new address.	N/A	0	1	2
4) I was homeless.	N/A	0	1	2
5) My husband or partner lost his job.	N/A	0	1	2
6) I lost my job even though I wanted to go on working.	N/A	0	1	2
7) I argued with my husband or partner more than usual.	N/A	0	1	2
8) My husband or partner said he didn't want me to be pregnant.	N/A	0	1	2
9) I had a lot of bills I couldn't pay.	N/A	0	1	2
10) I was in a physical fight.	N/A	0	1	2
11) My husband or partner or I went to jail.	N/A	0	1	2
12) Someone very close to me had a problem with drinking or drugs.	N/A	0	1	2
13) Someone very close to me died.	N/A	0	1	2
14) I felt emotionally upset (for example, angry, sad, or frustrated) as a result of how I was treated based on my race.	N/A	0	1	2

INSTRUCTIONS *The next four questions ask about smoking, alcohol use, and drug use. Remember that all your answers are confidential. Read each item and then pick the choice that best matches your experience.*

1) In the last month, how many alcoholic drinks have you had in an average week?

- ☐ 7 drinks or more a week
- ☐ 4 to 6 drinks a week
- ☐ 1 to 3 drinks a week
- ☐ Less than 1 drink a week
- ☐ I don't drink alcohol

2) How many cigarettes do you smoke on an average day *now*? (A pack has 20 cigarettes.)

- ☐ 21 cigarettes or more
- ☐ 11 to 20 cigarettes
- ☐ 6 to 10 cigarettes
- ☐ 1 to 5 cigarettes
- ☐ Less than 1 cigarette
- ☐ I don't smoke now

3) Did you quit smoking during this pregnancy?

- ☐ No, I still smoke
- ☐ No, but I cut back
- ☐ Yes, I quit before I found out I was pregnant
- ☐ Yes, I quit when I found out I was pregnant
- ☐ Yes, I quit later in my pregnancy
- ☐ I never smoked during this pregnancy

4) In the last month, have you used any of these drugs? For each item, circle Y (Yes) if you used it or circle N (No) if you did not.

Prescription drugs	Y	N
If yes, write what kinds: _____		
Marijuana (pot, bud, trees) or hashish (hash)	Y	N
Amphetamines (crystal meth, crank, speed)	Y	N
Cocaine (rock, coke, crack) or heroin	Y	N
Tranquilizers (downers) or hallucinogens (LSD/acid, PCP/angel dust, ecstasy)	Y	N

INSTRUCTIONS *The last two questions ask about your exercise habits and other services you may be getting during your pregnancy.*

1) In the past month, how many days a week did you get at least 30 minutes of physical activity or exercise? (For example, walking, dancing, swimming, yard work, or sweeping.) Check one answer.

- ☐ Less than 1 day per week
- ☐ 1 to 4 days per week
- ☐ 5 or more days per week
- ☐ I was told by a doctor, nurse, or other health care worker not to exercise

2) Have you gotten any of these services during this pregnancy? Please check all that apply.

- ☐ WIC (the Special Supplemental Nutrition Program for Women, Infants, and Children)
- ☐ Food stamps
- ☐ Nurse-Family Partnership
- ☐ Mental health counseling
- ☐ Smoking cessation programs (help with quitting smoking)
- ☐ Welfare, TANF (Temporary Assistance for Needy Families), or other public assistance
- ☐ Other services: _____

Please share your comments!

APPENDIX C: SURVEY 3

The GROUPS Study

Group Outcomes, Pregnancy and Stress Study

Your Feelings after Having your Baby: Joys, Concerns, and Adjusting to Motherhood

Please return to Sarah Covington-Kolb in the Centering office and she will give you your gift card.

- Thank you for filling out our survey! It should take you about 15 minutes to answer the questions.
- Please try to answer all the questions. You can be totally honest—your answers will not be shared in a way that can identify you.

Questionnaire 3

Participant Number:

INSTRUCTIONS *This is a list of words that describe different feelings and emotions. Read each word and pick the number that matches how much you have felt this way in the PAST WEEK.*

How often have you felt this way in the LAST WEEK?					
	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
1) Interested	0	1	2	3	4
2) Distressed	0	1	2	3	4
3) Excited	0	1	2	3	4
4) Upset	0	1	2	3	4
5) Strong	0	1	2	3	4
6) Guilty	0	1	2	3	4
7) Scared	0	1	2	3	4
8) Hostile	0	1	2	3	4
9) Enthusiastic	0	1	2	3	4
10) Proud	0	1	2	3	4
11) Irritable	0	1	2	3	4
12) Alert	0	1	2	3	4
13) Ashamed	0	1	2	3	4
14) Inspired	0	1	2	3	4
15) Nervous	0	1	2	3	4
16) Determined	0	1	2	3	4
17) Attentive	0	1	2	3	4
18) Jittery (or restless)	0	1	2	3	4
19) Active	0	1	2	3	4
20) Afraid	0	1	2	3	4

INSTRUCTIONS *This set of questions asks you about how you have been feeling in the PAST WEEK. Please circle the number that best fits how you feel about each question:*

- Rarely or none of the time (less than 1 day)
- Some or a little of the time (1-2 days)
- Occasionally or a moderate amount of time (3-4 days)
- Most or all of the time (5-7 days)

How often have you felt this way in the LAST WEEK?				
	Less than 1 day (rarely)	1-2 days (Some or a little)	3-4 days (Occasionally)	5-7 days (Most or all of the time)
1) I felt that I could not shake off the blues even with help from my family or friends.	<1	1-2	3-4	5-7
2) I felt that I was just as good as other people.	<1	1-2	3-4	5-7
3) I had trouble keeping my mind on what I was doing.	<1	1-2	3-4	5-7
4) I felt depressed.	<1	1-2	3-4	5-7
5) I felt hopeful about the future.	<1	1-2	3-4	5-7
6) I thought my life had been a failure.	<1	1-2	3-4	5-7
7) I felt fearful.	<1	1-2	3-4	5-7
8) I was happy.	<1	1-2	3-4	5-7
9) I talked less than usual.	<1	1-2	3-4	5-7
10) I felt lonely.	<1	1-2	3-4	5-7
11) People were unfriendly.	<1	1-2	3-4	5-7
12) I enjoyed life.	<1	1-2	3-4	5-7
13) I had crying spells.	<1	1-2	3-4	5-7
14) I felt sad.	<1	1-2	3-4	5-7
15) I felt that people dislike me.	<1	1-2	3-4	5-7

INSTRUCTIONS *Please read each item and circle the number that best represents how you have felt over the past two weeks.*

How often have you felt this way in the LAST TWO WEEKS?	Strongly disagree	Disagree	Some-what disagree	Neutral	Somewhat agree	Agree	Strongly agree
1) I am a good mother.	0	1	2	3	4	5	6
2) I feel rested.	0	1	2	3	4	5	6
3) I am comfortable with the way I've chosen to feed my baby (either bottle or breast, or both).	0	1	2	3	4	5	6
4) My baby and I understand each other.	0	1	2	3	4	5	6
5) I am able to relax and enjoy time with my baby.	0	1	2	3	4	5	6
6) There are people in my life that I can trust to care for my baby when I need a break.	0	1	2	3	4	5	6
7) I am comfortable allowing a trusted friend or relative to care for my baby (including baby's father or partner).	0	1	2	3	4	5	6
8) I am getting enough adult interaction.	0	1	2	3	4	5	6
9) I am getting enough encour-agement from other people.	0	1	2	3	4	5	6
10) I trust my own feelings (instincts) when it comes to taking care of my baby.	0	1	2	3	4	5	6
11) I take a little time each week to do something for myself.	0	1	2	3	4	5	6
12) I am taking good care of my baby's physical needs (feedings, changing diapers, doctor's ap-pointments).	0	1	2	3	4	5	6

Instructions continue from page 4...

How often have you felt this way in the LAST TWO WEEKS?	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
13) I am taking good care of my physical needs (eating, showering, etc.).	0	1	2	3	4	5	6
14) I make good decisions about my baby's health and well being.	0	1	2	3	4	5	6
15) My baby and I are getting into a routine.	0	1	2	3	4	5	6
16) I worry about how other people judge me (as a mother).	0	1	2	3	4	5	6
17) I am able to take care of my baby and my other responsibilities.	0	1	2	3	4	5	6
18) Anxiety or worry often interferes with my mothering ability.	0	1	2	3	4	5	6
19) As time goes on, I am getting better at taking care of my baby.	0	1	2	3	4	5	6
20) I am satisfied with the job I am doing as a new mother.	0	1	2	3	4	5	6

INSTRUCTIONS

This question asks about services you may be getting since having your baby.

1) Have you gotten any of these services since having your baby? Please check all that apply.

- ☐ WIC (the Special Supplemental Nutrition Program for Women, Infants, and Children)
- ☐ Food stamps (or SNAP)
- ☐ Nurse-Family Partnership
- ☐ Mental health counseling
- ☐ Smoking cessation programs (help with quitting smoking)
- ☐ Welfare, TANF (Temporary Assistance for Needy Families), or other public assistance
- ☐ Other services: _____

INSTRUCTIONS *These statements concern the different sorts of emotional reactions parents have when caring for young babies. Please select the response which is closest to your own feelings.*

1) When I am caring for the baby, I get feelings of annoyance or irritation:
- ☐ very frequently
- ☐ frequently
- ☐ occasionally
- ☐ very rarely
- ☐ never

2) When I am caring for the baby I get feelings that the child is deliberately being difficult or trying to upset me:
- ☐ very frequently
- ☐ frequently
- ☐ occasionally
- ☐ very rarely
- ☐ never

3) Over the last two weeks I would describe my feelings for the baby as:
- ☐ dislike
- ☐ no strong feelings towards the baby
- ☐ slight affection
- ☐ moderate affection
- ☐ intense affection

4) Regarding my overall level of interaction with the baby, I:
- ☐ feel very guilty that I am not more involved
- ☐ feel moderately guilty that I am not more involved
- ☐ feel slightly guilty that I am not more involved
- ☐ I don't have any guilty feelings regarding this

5) When I interact with the baby, I feel:
- ☐ very incompetent and lacking in confidence
- ☐ moderately incompetent and lacking in confidence
- ☐ moderately competent and confident
- ☐ very competent and confident

6) When I am with the baby I feel tense and anxious:
- ☐ very frequently
- ☐ frequently
- ☐ occasionally
- ☐ almost never

Instructions continue from page 6...

7) When I am with the baby and other people are present, I feel proud of the baby:
- ☐ very frequently
- ☐ frequently
- ☐ occasionally
- ☐ almost never

8) I try to involve myself as much as I possibly can playing with the baby:
- ☐ this is true
- ☐ this is untrue

9) When I have to leave the baby:
- ☐ I sometimes feel rather sad (or it's difficult to leave)
- ☐ I often feel rather sad (or it's difficult to leave)
- ☐ I have mixed feelings of both sadness and relief
- ☐ I sometimes feel rather relieved (and it's easy to leave)
- ☐ I usually feel rather relieved (and it's easy to leave)

10) When I am with the baby:
- ☐ I always get a lot of enjoyment/satisfaction
- ☐ I frequently get a lot of enjoyment/satisfaction
- ☐ I occasionally get a lot of enjoyment/satisfaction
- ☐ I very rarely get a lot of enjoyment/satisfaction

11) When I am not with the baby, I find myself thinking about the baby:
- ☐ almost all the time
- ☐ very frequently
- ☐ frequently
- ☐ occasionally
- ☐ not at all

12) When I am with the baby:
- ☐ I usually try to prolong the time I spend with him/her
- ☐ I usually try to shorten the time I spend with him/her

13) When I have been away from the baby for a while and I am about to be with him/her again, I usually feel:
- ☐ intense pleasure at the idea
- ☐ moderate pleasure at the idea
- ☐ mild pleasure at the idea
- ☐ no feelings at all about the idea
- ☐ negative feelings about the idea

14) I now think of the baby as:
- ☐ very much my own baby
- ☐ a bit like my own baby
- ☐ not yet really my own baby

Instructions continue from page 8...

15. Regarding the things that we have had to give up because of the baby:
- ☐ I find that I resent it quite a lot
- ☐ I find that I resent it a moderate amount
- ☐ I find that I resent it a bit
- ☐ I don't resent it at all

16. Since having the baby, I have felt that I do not have enough time for myself to pursue my own interests:
- ☐ almost all the time
- ☐ very frequently
- ☐ occasionally
- ☐ not at all

17. Taking care of this baby is a heavy burden of responsibility. I believe this is:
- ☐ very much so
- ☐ somewhat so
- ☐ slightly so
- ☐ not at all so

18. I trust my own judgment in deciding what the baby needs:
- ☐ Almost never
- ☐ Occasionally
- ☐ Most of the time
- ☐ Almost all the time

19. Usually when I am with the baby:
- ☐ I am very impatient
- ☐ I am a bit impatient
- ☐ I am moderately patient
- ☐ I am extremely patient

INSTRUCTIONS *This set of questions asks you to think about how you have been feeling in the past month. Please circle the number that best fits how you feel about each question.*

In the LAST MONTH...	Never	Almost Never	Some-times	Fairly Often	Very Often
1) How often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2) How often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3) How often have you felt nervous and "stressed"?	0	1	2	3	4
4) How often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
5) How often have you felt that things were going your way?	0	1	2	3	4
6) How often have you found that you could not cope with all the things that you had to do?	0	1	2	3	4
7) How often have you been able to control irritations in your life?	0	1	2	3	4
8) How often have you felt that you were on top of things?	0	1	2	3	4
9) How often have you been angered because of things that were outside of your control?	0	1	2	3	4
10) How often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

INSTRUCTIONS *The next five questions ask about the food eaten in your household in the last 30 days. Read each item and then pick the choice that best matches your experience.*

In the LAST MONTH...

1) The food that you bought just didn't last, and you didn't have money to get more. Was this often, sometimes, or never true for you or your household in the last month?

- ☐ Often true
- ☐ Sometimes true
- ☐ Never true

2) You couldn't afford to eat the healthy foods that you wanted to. Was this often, sometimes, or never true for you or your household in the last month?

- ☐ Often true
- ☐ Sometimes true
- ☐ Never true

3) In the last month, did you ever cut the size of your meals or skip meals because there wasn't enough money for food?

- ☐ Yes
- ☐ No

4) In the last month, did you ever eat less than you felt you should because there wasn't enough money for food?

- ☐ Yes
- ☐ No

5) In the last month, were you ever hungry but didn't eat because there wasn't enough money for food?

- ☐ Yes
- ☐ No

INSTRUCTIONS *The next ten questions ask about how you usually feel. Please be as honest and accurate as you can throughout. Try not to let your response to one statement influence your responses to other statements. There are no 'correct' or 'incorrect' answers. Answer according to your own feelings, rather than how you think most people would answer.*

	I disagree a lot	I disagree a little	I neither agree nor disagree	I agree a little	I agree a lot
1) In uncertain times, I usually expect the best.	0	1	2	3	4
2) It's easy for me to relax.	0	1	2	3	4
3) If something can go wrong for me, it will.	0	1	2	3	4
4) I'm always optimistic about my future.	0	1	2	3	4
5) I enjoy my friends a lot.	0	1	2	3	4
6) It's important for me to keep busy.	0	1	2	3	4
7) I hardly ever expect things to go my way.	0	1	2	3	4
8) I don't get upset too easily.	0	1	2	3	4
9) I rarely count on good things happening to me.	0	1	2	3	4
10) Overall, I expect more good things to happen to me than bad.	0	1	2	3	4

INSTRUCTIONS *For each of the following statements, please circle the number which shows how you feel about the support you have RIGHT NOW.*

	Never	Rarely	Some of the time	Most of the time	Always
1) I have good friends who support me.	0	1	2	3	4
2) My family is always there for me.	0	1	2	3	4
3) My husband/partner/boyfriend helps me a lot.	0	1	2	3	4
4) There is conflict with my husband/partner/boyfriend.	0	1	2	3	4
5) I feel controlled by my husband/partner/boyfriend.	0	1	2	3	4
6) I feel loved by my husband/partner/boyfriend.	0	1	2	3	4

INSTRUCTIONS *This question is about things that may have happened since you had your baby. Circle N/A (not applicable) if you did not experience an event since having your baby. Circle how stressful you found each event you did experience.*

Since having your baby...	Didn't happen to me	Not stressful	Somewhat stressful	Very stressful
1) A close family member was very sick and had to go into the hospital.	N/A	0	1	2
2) I got separated or divorced from my husband or partner.	N/A	0	1	2
3) I moved to a new address.	N/A	0	1	2
4) I was homeless.	N/A	0	1	2
5) My husband or partner lost his job.	N/A	0	1	2
6) I lost my job even though I wanted to go on working.	N/A	0	1	2
7) I argued with my husband or partner more than usual.	N/A	0	1	2
8) My husband or partner said he didn't want to have this baby.	N/A	0	1	2
9) I had a lot of bills I couldn't pay.	N/A	0	1	2
10) I was in a physical fight.	N/A	0	1	2
11) My husband or partner or I went to jail.	N/A	0	1	2
12) Someone very close to me had a problem with drinking or drugs.	N/A	0	1	2
13) Someone very close to me died.	N/A	0	1	2
14) I felt emotionally upset (for example, angry, sad, or frustrated) as a result of how I was treated based on my race.	N/A	0	1	2

INSTRUCTIONS *The next four questions ask about your relationship with your husband, partner, or boyfriend since having your baby. Read each item and then circle Y (Yes) if you experienced each item since having your baby. Circle N (No) if you did not experience each item since having your baby.*

Since having your baby...		
1) Your husband, partner, or boyfriend threatened you or made you feel unsafe in some way.	Y	N
2) You were frightened for the safety of yourself or your family because of the anger or threats of your husband, partner, or boyfriend.	Y	N
3) Your husband, partner, or boyfriend tried to control your daily activities, for example, controlling who you could talk to or where you could go.	Y	N
4) Your husband, partner, or boyfriend forced you to take part in touching or any sexual activity you did not want to.	Y	N
5) Your husband, partner, or boyfriend pushed, hit, slapped, kicked, choked, or physically hurt you in any way.	Y	N

INSTRUCTIONS *The next two questions ask about smoking. Read each item and then pick the choice that best matches your experience.*

1) How many cigarettes do you smoke on an average day *now*? (A pack has 20 cigarettes.)

- ☐ 41 cigarettes or more
- ☐ 21 to 40 cigarettes
- ☐ 11 to 20 cigarettes
- ☐ 6 to 10 cigarettes
- ☐ 1 to 5 cigarettes
- ☐ Less than 1 cigarette
- ☐ I don't smoke now

2) Did you quit smoking during this pregnancy or since having your baby?

- ☐ No, I still smoke
- ☐ No, but I cut back
- ☐ Yes, I quit during my pregnancy
- ☐ Yes, I quit after having my baby
- ☐ I never smoked

INSTRUCTIONS *The next three questions ask about feeding your baby.*

1) In the last 7 days, was your baby fed... (check all that apply)

- ☐ Breast milk
- ☐ Formula
- ☐ Water
- ☐ Sugar water
- ☐ Cow's milk or any other milk (rice, soy, goat, or other)
- ☐ 100% fruit or 100% vegetable juice
- ☐ Sweet drinks (juice drinks, soft drinks, soda, sweet tea, etc.)
- ☐ Baby cereal
- ☐ Other (please write)

_____

2) Who or what helped you with your decisions about feeding your baby? (check all that apply)

- ☐ Myself (no one)
- ☐ Boyfriend/husband/partner
- ☐ Baby's grandmother
- ☐ Other relative
- ☐ Doctor or midwife
- ☐ Centering group
- ☐ Lactation consultant
- ☐ Previous experience with other child
- ☐ Books/magazines
- ☐ Friends/coworkers
- ☐ Prenatal/breastfeeding class
- ☐ Internet
- ☐ Breastfeeding support group (like La Leche)
- ☐ Other, please write _____

3) Did you ever breastfeed or feed your baby breastmilk?

- ☐ No (got to page 14)
- ☐ Yes, but I stopped (go to page 15)

How old was your baby when you completely stopped breastfeeding or feeding your baby breast milk?

_____ DAYS (if younger than 2 weeks) OR _____ WEEKS

- ☐ Yes, and I'm still breastfeeding (go to bottom of page 16)

INSTRUCTIONS **PLEASE ANSWER THESE QUESTIONS IF YOU DID NOT EVER BREAST-FEED YOUR NEW BABY.**

How important were each of the following reasons for your decision **NOT to breastfeed** your baby? (PLEASE ANSWER EACH ITEM)

	Not at all important	Not very important	Somewhat important	Very important
1) My baby was sick and could not breastfeed.	0	1	2	3
2) I was sick or had to take medicine.	0	1	2	3
3) I thought I would not have enough milk.	0	1	2	3
4) A health professional said I should not breastfeed for medical reasons.	0	1	2	3
5) I believe that formula is as good as breastfeeding or that formula is better.	0	1	2	3
6) I thought that breastfeeding would be too inconvenient.	0	1	2	3
7) I tried breastfeeding before and didn't like it or it didn't work out.	0	1	2	3
8) I wanted to be able to leave the baby for several hours at a time.	0	1	2	3
9) I wanted to go on a weight loss diet.	0	1	2	3
10) I wanted to go back to my usual diet.	0	1	2	3
11) I wanted to smoke again or smoke more than I should while breastfeeding.	0	1	2	3
12) I had too many household duties.	0	1	2	3
13) I planned to go back to work or school.	0	1	2	3
14) I wanted or needed someone else to feed my baby.	0	1	2	3
15) Someone else wanted to feed the baby.	0	1	2	3
16) I wanted my body back to myself.	0	1	2	3
17) The baby's father didn't want me to breastfeed.	0	1	2	3
18) The baby's grandmother didn't want me to breastfeed.	0	1	2	3
19) I wanted to use medication that can't be used while breastfeeding.	0	1	2	3
20) I had other children to take care of.	0	1	2	3
21) I didn't want to.	0	1	2	3
22) I was embarrassed to breastfeed.	0	1	2	3

INSTRUCTIONS **PLEASE ANSWER THESE QUESTIONS IF YOU EVER BREASTFED YOUR NEW BABY BUT HAVE STOPPED.**

How important were each of the following reasons for your decision to **STOP breastfeeding** your baby? (PLEASE ANSWER EACH ITEM)

	Not at all important	Not very important	Somewhat important	Very important
1) My baby had trouble sucking or latching on.	0	1	2	3
2) My baby became sick and could not breastfeed.	0	1	2	3
3) My baby began to bite.	0	1	2	3
4) My baby lost interest in nursing or began to wean him/herself.	0	1	2	3
5) My baby was old enough that the difference between breast milk and formula no longer mattered.	0	1	2	3
6) Breast milk alone did not satisfy my baby.	0	1	2	3
7) I thought that my baby was not gaining enough weight.	0	1	2	3
8) A health professional said my baby was not gaining enough weight.	0	1	2	3
9) I had trouble getting the milk flow to start.	0	1	2	3
10) I didn't have enough milk.	0	1	2	3
11) My nipples were sore, cracked, or bleeding.	0	1	2	3
12) My breasts were overfull or engorged.	0	1	2	3
13) My breasts were infected or abscessed.	0	1	2	3
14) My breasts leaked too much.	0	1	2	3
15) Breastfeeding was too painful.	0	1	2	3
16) Breastfeeding was too tiring.	0	1	2	3
17) I was sick or had to take medicine.	0	1	2	3
18) Breastfeeding was too inconvenient.	0	1	2	3
19) I did not like breastfeeding.	0	1	2	3
20) I wanted to be able to leave my baby for several hours at a time.	0	1	2	3
21) I wanted to go on a weight loss diet.	0	1	2	3
22) I wanted to go back to my usual diet.	0	1	2	3
23) I wanted to smoke again or more than I did while breastfeeding.	0	1	2	3

INSTRUCTIONS *Continued from page 15...* **PLEASE ANSWER THESE QUESTIONS IF YOU EVER BREASTFED YOUR NEW BABY BUT HAVE STOPPED.**

How important were each of the following reasons for your decision to STOP breastfeeding your baby?	Not at all important	Not very important	Somewhat important	Very important
24) I had too many household duties.	0	1	2	3
25) I could not or did not want to pump or breastfeed at work.	0	1	2	3
26) Pumping milk no longer seemed worth the effort.	0	1	2	3
27) I was not present to feed my baby for reasons other than work.	0	1	2	3
28) I wanted or needed someone else to feed my baby.	0	1	2	3
29) Someone else wanted to feed the baby.	0	1	2	3
30) I did not want to breastfeed in public.	0	1	2	3
31) I wanted my body back to myself.	0	1	2	3
32) I became pregnant or wanted to become pregnant again.	0	1	2	3
33) The baby's father wanted me to stop breastfeeding.	0	1	2	3
34) The baby's grandmother wanted me to stop breastfeeding.	0	1	2	3
35) My employer/supervisor wanted me to stop breastfeeding.	0	1	2	3

INSTRUCTIONS *Based on the type of prenatal care you received, please let us know what was helpful about your appointments.*

Did you attend Centering groups for your prenatal care? _____
If yes, how did the groups help you?

If you attended individual prenatal care appointments, how did the appointments help you?

APPENDIX D: INITIAL INTERVIEW GUIDE

QUALITATIVE SEMI-STRUCTURED INTERVIEW QUESTIONS FOR CENTERING PARTICIPANTS: Initial face to face interview

Thank you again for taking the time to talk with me. We will be talking about your experiences of being pregnant, what's going on in your life, and about the Centering groups. Everyone's experience with pregnancy is different, and there are no right or wrong answers to these questions! What you tell me is confidential, and will be used as part of a research project to improve services for pregnant women, mothers, and their children. You can decide not to answer any question, and you can end the interview at any time. Do you have any questions about our interview before we begin?

1. I would like to start with asking you some questions about you, your pregnancy and what else has been going on in your life during your pregnancy.
    - How old are you?
    - How many weeks pregnant are you? When is your due date?
    - Is this your first child? (If no, how many other children do you have? Boys, girls? Ages?)
    - How is this pregnancy going for you? (If multiparous) How has this pregnancy compared with your past pregnancy (ies)?
        - Can you tell me about where you are living? Who are you living with? [probe for whether others stay there sometimes or fulltime]

    - Are you working? Can you tell me about your job? [probe for how job fits with career goals, if participant has done any training or education for work, if participant is satisfied with job]
    - If not working, probe if participant is looking for work, what sources of income are
    - For all, ask how they feel their income compares to their needs
- Who are the people who are most important to you right now? Why? How are they helping, guiding or supporting you?
    - IIs your family in the Greenville area? Are you from Greenville? [probe to gain an understanding of family environment and support]
- Have these relationships changed during your pregnancy? How?
- [If participant does not mention baby's father] Can you tell me about your relationship with the baby's father?
- Can you tell me about what you have been excited or happy about in this pregnancy?
- Can you tell me about what has been worrying you or causing you stress?
- Can you talk about what you do to try to help manage your worries or stress? [phrase next questions to ask about the specific worries/stressors mentioned in the previous question]
    - Probes: Who do you talk to about your worries? Do you take any time for yourself? Have you made any plans or preparations to change things that are worrying you? Do you ignore your worries? Does your faith play a role? Etc.

    - Can you walk me through [this stressful situation and what you've done to manage it]?
- Have you made any changes in how you take care of yourself since finding out you are pregnant?
    - Probes: Did you quit smoking, change your diet, change your exercise habits, stop drinking alcohol or using drugs? Try to make your personal relationships healthier? Reduce your stress?
    - Why did you decide to make these changes?
- Can you tell me how you are feeling about labor and delivery?
- Can you tell me how you are feeling about coming home with your baby?

2. Now, we're going to change the topic a bit, and talk about the Centering groups.
    - Can you tell me about why you decided to participate in Centering?
    - Can you tell me more about attending Centering – what makes it easy or hard to go to the groups? Let's start with what's easy.
        - [Also probe for hard examples] Do you have to make any special arrangements to have the time to attend the groups? (For example, arranging childcare, changing work schedule, finding transportation)
    - Does anyone come with you to the groups? Who?
    - Have the groups changed any feelings or opinions you have about pregnancy? About birth? About taking care of your baby?
    - Thinking back to the most recent Centering group you attended, what was the most important or most meaningful part of the session for you?

- Can you tell me more, describe it? What happened, were other members of the group involved, and what was your reaction?
- How has this affected you? Has it made you change how you think or what you do?

- Before we end the interview, do you have anything else you would like to share about your experiences?
- How was your experience with the interview process today? [any suggestions?]
- [Women may bring up difficult topics that are upsetting to them. At the end of these interviews, interviewer must bring closure to this discussion and may suggest a referral to social worker. For example: "It sounds like you are going through a tough time. Can I give you the number of someone you can talk to about X?" Interviewer may determine that a phone call to check in or assistance in identifying other resources to share is necessary prior to the next interview.]
- [Interviewer will provide gift card incentive at end of interview, discuss how participants prefer to be contacted for pregnancy phone interviews, gather primary phone number and secondary phone number for interviewer scheduling.]

QUALITATIVE SEMI-STRUCTURED INTERVIEW QUESTIONS FOR INDIVIDUAL PRENATAL CARE PARTICIPANTS: Initial face to face interview

Thank you again for taking the time to talk with me. We will be talking about your experiences of being pregnant, what's going on in your life, and about your prenatal care. Everyone's experience with pregnancy is different, and there are no right or wrong answers to these questions! What you tell me is confidential, and will be used as part of a research project to improve services for pregnant women, mothers, and their children.

You can decide not to answer any question, and you can end the interview at any time. Do you have any questions or concerns about our interview before we begin?

1. I would like to start with asking you some questions about you, your pregnancy and what else has being going on in your life during your pregnancy.
    - How old are you?
    - How many weeks pregnant are you? When is your due date?
    - Is this your first child? (If no, how many other children do you have? Boys, girls? Ages?)
    - How is this pregnancy going for you? (If multiparous) How has this pregnancy compared with your past pregnancy (ies)?
        - Can you tell me about where you are living? Who are you living with? [probe for whether others stay there sometimes or fulltime]
        - Are you working? Can you tell me about your job? [probe for how job fits with career goals, if participant has done any training or education for work, if participant is satisfied with job]
        - If not working, probe if participant is looking for work, what sources of income are
        - For all, ask how they feel their income compares to their needs

    - Who are the people who are most important to you right now? Why? How are they helping, guiding or supporting you?
        - IIs your family in the Greenville area? Are you from Greenville? [probe to gain an understanding of family environment and support]

    - Have these relationships changed during your pregnancy? How?
- [If participant does not mention baby's father] Can you tell me about your relationship with the baby's father?
- Can you tell me about what you have been excited or happy about in this pregnancy?
- Can you tell me about what has been worrying you or causing you stress?
- Can you talk about what you do to try to help manage your worries or stress? [phrase questions to ask about the specific worries/stressors mentioned in the previous question]
    - Probes: Who do you talk to about your worries? Do you take any time for yourself? Have you made any plans or preparations to change things that are worrying you? Do you ignore your worries? Does your faith play a role? Etc.
    - Can you walk me through [this stressful situation and what you've done to manage it]?
- Have you made any changes in how you take care of yourself since finding out you are pregnant?
    - Probes: Did you quit smoking, change your diet, change your exercise habits, stop drinking alcohol or using drugs? Try to make your personal relationships healthier? Reduce your stress?
    - Why did you decide to make these changes?
- Can you tell me how you are feeling about labor and delivery?
- Can you tell me how you are feeling about coming home with your baby?

2. Now, we're going to change the topic a bit, and talk about your prenatal care.
    - Can you tell me about attending your appointments? What makes it easy or hard to get to your appointments? Let's start with what's easy.
        - [Also probe for hard examples] Do you have to make any special arrangements to have the time to attend the groups? (For example, arranging childcare, changing work schedule, finding transportation)
    - The OB/GYN Center also offers prenatal care in groups, called Centering. Do you remember hearing about this choice? Can you tell me about your decision to receive individual care?
    - Has your prenatal care provider changed any feelings or opinions you have about pregnancy? About birth? About taking care of a baby?
    - Does anyone come with you to your appointments? Who?
    - Thinking back to your most recent prenatal care appointment, what was the most important or most meaningful part of the appointment for you?
        - Can you tell me more, describe it?
        - How has this affected you? Has it made you change how you think or what you do?
    - Before we end the interview, do you have anything else you would like to share about your experiences?
    - How was your experience with the interview process today? [any suggestions?]
    - [Women may bring up difficult topics that are upsetting to them. At the end of these interviews, interviewer must bring closure to this discussion and may suggest a referral to social worker. For example: "It sounds like you are going

through a tough time. Can I give you the number of someone you can talk to about X?" Interviewer may determine that a phone call to check in or assistance in identifying other resources to share is necessary prior to the next interview.]

- [Interviewer will provide gift card incentive at end of interview, discuss how participants prefer to be contacted for pregnancy phone interviews, gather primary phone number and secondary phone number for interviewer scheduling.]

APPENDIX E: PREGNANCY PHONE INTERVIEW GUIDE

CENTERING and INDIVIDUAL CARE PARTICIPANTS

[Remind participant of interview process if necessary, confirm time is still convenient]

- How are you feeling? How is your pregnancy going?

[Interviewer should transition to PNC questions: I'd like to start by asking you about your prenatal care]

QUESTIONS FOR CENTERING PARTICIPANTS

- When was your last Centering group [that you attended]? Did anyone come to group with you?
- Can you describe your individual (1:1) time with your provider?
    - Probes if needed: What happened? What questions did you ask? What did you learn? How did you feel after your 1:1 time? Did you get what you needed?
- Can you describe the group discussion?
    - Probes if needed: What were the discussion topics? What activities did the group do?
- Can you describe how you participated in the discussion? Can you describe your interactions with the other women?
- What about the session was helpful for you? Not helpful?
- How did you feel after you left the clinic?

- From the time you got to the clinic to when you left, what was the most meaningful or important part of the session for you?
- How has this last session influenced your mood? Your behavior? Your relationships with others?
- How has this most recent appointment influenced your health? Your baby's health?
- How has this last session influenced your feelings or plans for labor, birth, and your stay in the hospital? How confident do you feel about managing labor and birth? Do you feel you can influence what happens during labor, birth, and your hospital stay? How?
- How has this last session influenced your feelings or plans for taking care of your newborn? How confident do you feel about taking care of your baby when you get home? Why?
- How would you describe your relationship with the group leader? (Probes: what's your communication like? Does she treat you as an individual? Do you feel you understand the reasons for the different tests, procedures, and questions that are part of your care? Do you feel like you share in decisions about your care?)

QUESTIONS FOR INDIVIDUAL CARE PARTICIPANTS

- When was your last prenatal care appointment? Did anyone come with you?
- Can you describe your time with your provider?
    - Probes if needed: What happened? What questions did you ask? What did you learn? How did you feel after your 1:1 time? Did you get what you needed?

- What else happened as part of your appointment? (tests, labs, etc.)
- What about the appointment was helpful for you? Not helpful?
- How did you feel after you left the clinic?
- From the time you got to the clinic to when you left, what was the most meaningful or important part of the appointment for you?
- How has this most recent appointment influenced your mood? Your behavior? Your relationships with others?
- How has this most recent appointment influenced your health? Your baby's health?
- How has this most recent appointment influenced your feelings or plans for labor & birth, and your stay in the hospital? How confident do you feel about managing labor and birth? Do you feel you can influence what happens during labor, birth, and your hospital stay? How?
- How has this most recent appointment influenced your feelings or plans for taking care of your newborn? How confident do you feel about taking care of your baby? Why?
- How would you describe your relationship with your provider? (Probes: what's your communication like? Does she treat you as an individual? Do you feel you understand the reasons for the different tests, procedures, and questions that are part of your care? Do you feel like you share in decisions about your care?)

QUESTIONS FOR BOTH CENTERING AND INDIVIDUAL CARE GROUPS

- *[Interviewer should transition by saying…. I'd like to check in with you on what's going on outside of prenatal care.]*
- What's been making you excited or happy since we talked XX weeks ago?
- What's stressful to you right now? [follow up on topics raised in prior interviews if applicable]
- What's helpful to reduce this stress?
- How could your prenatal care/Centering help you with this stress? [phrase questions to ask about the specific worries/stressors mentioned in the previous question if appropriate]
- Before we end the interview, do you have anything else you would like to share about your experiences?
- How was your experience with the interview process today? [any suggestions?]

APPENDIX F: POSTPARTUM INTERVIEW GUIDE

GROUPS II Qualitative Semi-Structured Postpartum Interview Guide

CENTERING and INDIVIDUAL CARE PARTICIPANTS

Two postpartum calls (3 & 6 weeks); last interview may be conducted face to face at time of postpartum (approx. six weeks) checkup, depending on participant's preference and interviewer availability.

Call 1 postpartum:

- Congratulations!! How are you doing? How's the baby? Name, Etc.
- Can you tell me about your baby's birth? Probe for who helped in labor, whether birth was early, any health complications for mother or baby.
    - What about the labor and birth experience was what you expected? Unexpected?
- Can you tell me about your time in the hospital?
- Do you feel you understood the reasons for the different procedures, tests, and questions that were part of your labor, birth and care in the hospital? Do you feel like you shared in decisions about your care during your labor, birth and time at the hospital?
- How did Centering/your prenatal care help you feel prepared for labor, birth, and your stay in the hospital? What else could have helped?
- What was it like for you when you came home from the hospital?

- Who helped you in the first few days after you came home?
- Can you tell me what it's like being a mom so far?
- Can you talk about how prepared you've felt for taking care of your baby? [Probe for what she felt prepared for and what she didn't]
- How did Centering/your prenatal care help you feel prepared to take care of your baby when you came home? What else could have helped?
- What's stressful to you right now? [follow up on topics raised in prenatal interviews if applicable]
- What's helpful to reduce this stress?
- How could your prenatal care/Centering have prepared you better to cope with this stress? [phrase questions to ask about the specific worries/stressors mentioned in the previous question if applicable]

- I'm going to ask you a few more questions about how you feel about Centering/your prenatal care now.
    - Do you think Centering/your prenatal care has affected how you take care of your health now? Your baby's health? Can you talk about how?
    - Do you think Centering/your prenatal care has affected how you are as a parent? Can you talk about how?
    - Do you think Centering/your prenatal care has affected how you relate to the baby's father or your partner? Can you talk about how?
- Thinking back to your experience with Centering/your prenatal care, what was the most important or most meaningful aspect, or part, of your prenatal care for you?

- Can you tell me more, describe it?
- How has this affected you? Has it made you change how you think or what you do?

- Have you been in touch with any of the staff or other patients from the OB/Gyn Center? Who?
- Before we end the interview, do you have anything else you would like to share about your experiences?
- [Women may bring up difficult topics that are upsetting to them. At the end of these interviews, interviewer must bring closure to this discussion and may suggest a referral to social worker. For example: "It sounds like you are going through a tough time. Can I give you the number of someone you can talk to about X?" Interviewer may determine that a phone call to check in or assistance in identifying other resources to share is necessary prior to the next interview.]
- [Interviewer will remind participant of last interview, discuss if participant prefers phone or face-to-face interview after her postpartum checkup. Interviewer will also remind participant that she will receive the incentives, $5 each for the phone interviews during pregnancy, and $10 for each of the postpartum interviews, at the second and final postpartum interview.]

Call 2 postpartum:

- How are you doing?
- How have you been since we last talked?
- Can you tell me what it's like for you being a mom these last few weeks? What's been hard? What's been easy?

- Can you tell me about anything that's been unexpected or surprising?
- Can you tell me about anyone who has been helpful or supportive to you?
- What's stressful to you right now? [follow up on topics raised in prior interviews if applicable]
- What's helpful to reduce this stress?
- How could your prenatal care/Centering have prepared you better to cope with this stress? [phrase questions to ask about the specific worries/stressors mentioned in the previous question if applicable]
- Think back to any problems or challenges you've had in the last two to three weeks as a new mom (probe for description of problem/challenge). What did you do to solve it? Can you walk me through this?
- We talked about this a few weeks ago, but I'm interested in understanding if you have more to add based on your experiences in the last few weeks.
- As you look back on your pregnancy, how are you feeling about Centering/your prenatal care? [Interviewer should be prepared to prompt participant on what she mentioned previously]
- Do you think Centering/your prenatal care has had an impact on you since having your baby? Can you talk about how?
    - Do you think Centering/your prenatal care has affected how you take care of your health? Your baby's health? Can you talk about how?
    - Do you think Centering/your prenatal care has affected how you are as a parent? Can you talk about how?

- Do you think Centering/your prenatal care has affected how you relate to the baby's father or your partner? Can you talk about how?

- Thinking back to your experience with Centering/prenatal care, what was the most important or most meaningful aspect, or part, of your prenatal care for you?
  - Is this the same or different as what we talked about at the last interview? [Interviewer should be prepared to prompt participant on what she mentioned previously]
  - Can you tell me more, describe it?
  - How has this affected you? Has it made you change how you think or what you do?
- Have you been in touch with any of the staff or other patients from the OB/Gyn Center? Who?
- Before we end the interview, do you have anything else you would like to share about your experiences?
- Is there anything you would like to tell me about your experience with the interview process?
- [Women may bring up difficult topics that are upsetting to them. At the end of these interviews, interviewer must bring closure to this discussion and may suggest a referral to social worker. For example: "It sounds like you are going through a tough time. Can I give you the number of someone you can talk to about X?" Interviewer may determine that a phone call to check in or assistance in identifying other resources to share is necessary prior to the next interview.]

- [Interviewer should spend a few minutes closing out the interview process. Interviewer will provide incentive gift card for pregnancy phone interviews and postpartum interviews, and thank participant for their participation, bring process to a close.]