2017

Better Together: Group Prenatal Care Improves Outcomes

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BETTER TOGETHER: GROUP PRENATAL CARE IMPROVES OUTCOMES

A MASTER'S PROJECT

SUBMITTED TO THE GRADUATE FACULTY

OF THE GRADUATE SCHOOL

BETHEL UNIVERSITY

BY

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IN PARTIAL REQUIREMENTS

FOR THE DEGREE OF

MASTER OF SCIENCE IN NURSE-MIDWIFERY

MAY 2017

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May 2017

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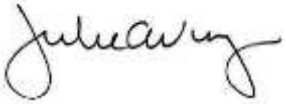
Project Advisor Signature:	
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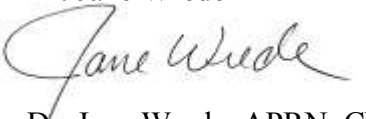
Second Reader Signature:	
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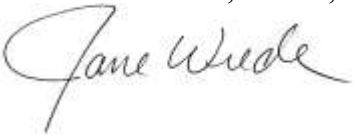
Director of Graduate Nursing Program Signature:	

Acknowledgments

Over the past two years I have delved into the study of all things nurse-midwifery and upon that I have discovered a passion within it, group prenatal care. While uncovering the findings, and synthesizing, and writing this paper, as well as partaking in my studies at Bethel University, I have had the help of many and would like to show my appreciation here.

Thank you to the Nurse-Midwifery faculty at Bethel University. I would like to give a special thanks to Katrina Wu, for knowing my heart well enough to introduce me to CenteringPregnancy, as well as to my detail-oriented and patient advisor, Julie Ann Vingers, you were such a wonderful and necessary voice over my shoulder as I was putting this project together. I would also like to thank the Bethel Writing Center and all the editors for helping pull this paper together in perfect APA format.

Additionally, I am grateful to have had the most encouraging classmates of all time to share in this journey with. Thank you to my selfless friend, Amber, who gave so much of herself to help with my sanity throughout this graduate school process. Mom, Dad, Leah, and Dan: thank you for traveling to see me, for reaching out and for believing in me especially these last two years as I have missed many family holidays and get-togethers. I would like to thank God, for guiding my heart and leading me into this field of nurse-midwifery: you brought me into it and as you promised, you were with me in it, and have seen me through it.

Lastly, I would like to thank the midwives at HealthPartners who gave me my first experiences with group prenatal care. I will always be thankful to have been with a group of midwives willing to try something new for the sake of good care for women. You all are wonderful.

Abstract

Title: Better Together: Group Prenatal Care Improves Outcomes

Background: Neonatal outcomes have not improved over the past 30 years in spite of increases in funding and utilization. New models of prenatal care, such as Centering Pregnancy, need to be evaluated for effectiveness. This critical review of the literature focuses on comparing birth outcomes, maternal weight gain, and adequacy of prenatal care between group and traditional care models.

Results: Newborns with mothers in group care were more likely to be born at later gestational ages and with higher birth weights. Mothers in group care were more likely to use contraception postpartum and have better prenatal attendance. Women in at-risk populations were more likely to follow the Institute of Medicine's recommended weight gain guidelines than those in traditional care.

Conclusions: Group prenatal care positively affects birth outcomes, maternal weight gain, and adequacy of prenatal care in the general population as well as in at-risk groups. Group prenatal care is a good alternative method of prenatal care for women.

Implications: Evidence shows the benefits of group care in all areas researched. Nurse-midwives need to implement this by shifting towards group prenatal care as well as participating in research studies focused on cost-analysis of care models, psychosocial outcomes, the effect of group care on higher risk pregnancies, and provider satisfaction.

Keywords: Group prenatal care, Centering Pregnancy, antenatal care, birth outcomes, preterm birth, gestational age, low birth weight, maternal weight gain, adequacy of care, behavioral risk, postpartum family planning

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Chapter 1: Introduction

Prenatal care is the gateway into health care for many women across countries, demographics, and socioeconomic statuses. Traditionally, prenatal care has consisted of seeing a healthcare provider monthly for the first 28 weeks gestation followed by visits every two weeks, and when the mother reaches 36 weeks gestation, she will visit her healthcare provider weekly until birth. The current traditional prenatal care model in the United States dates back to the early 1900s. Prenatal care was seen as a way to reduce infant mortality and to identify pregnancy complications such as preeclampsia (Alexander & Kotelchuck, 2001). Furthermore, into the 20th century, researchers began to connect the adequacy of prenatal care to the number of visits women had with their healthcare provider and how their attendance affected their infant's gestational age and weight at birth. Researchers found that by attending an adequate number of prenatal care visits, infant mortality was reduced as were the number of low birth weight infants and preterm births. (Institute of Medicine: Committee to Study the Prevention of Low Birthweight, 1985). Prenatal care was then seen as a public health measure to reduce infant mortality. In twenty years, the infant mortality rate has decreased and prenatal care utilization especially by low-income women in the first trimester has risen (Hamilton, Martin, Osterman, Curtin & Matthews, 2015). However, there has been a rise in low birth weight and preterm births since the 1980s. In 2012, the rate of low birth weight (LBW) infants was found to have increased to 8.0% from 6.8% in 1983 (Hamilton et al., 2015). In spite of worse birth outcomes, infant mortality have decreased in the last twenty years due to improved medical technology, not as a result of utilization of prenatal care. This urges consumers, researchers, and providers to wonder once again, what qualifies as adequate prenatal care?

Other measures must be addressed when discussing effective prenatal care; yes, prenatal care attendance must be considered, but is the care of high quality? Are the mother's health behaviors being changed? Are birth outcomes such as low birth weight and preterm deliveries being reduced? Measurements such as maternal weight gain and health care behaviors are also predictors of birth outcomes and must be considered.

Sharon Schindler Rising, a certified nurse midwife, was on a mission to create a new model of prenatal care founded on the principles of assessment, education, and support, and in 1993, Centering Pregnancy, a model of group prenatal care was born (Massey, Rising & Ickovics, 2006). In this model, 10 to 12 women are grouped together according to their similar due dates. After their initial prenatal visit, women begin the Centering group starting between 12-16 weeks gestation and continue to meet for a total of eight to 10, two-hour visits throughout the duration of their pregnancies and early postpartum period (Massey et al., 2006). During each visit the women are involved in their physical exam, documenting their weight and blood pressure as well as participating and facilitating discussions surrounding their self-assessment worksheets regarding different educational topics. The group time facilitates learning and social support (Massey et al., 2006) and also promotes empowerment, engagement, and community development.

Statement of Purpose

This paper addresses the pertinent need of recognizing effective prenatal care by reviewing the literature and identifying how group prenatal care affects birth outcomes, maternal weight gain, and adequacy of prenatal care.

Need for the Critical Review of a Nurse-Midwife Problem

As previously stated, there is a lack of evidence supporting the current model of prenatal care being followed by the majority of maternal health practitioners. Further, a systematic review of observational and randomized trials concluded that there was no evidence supporting the idea that routine prenatal care improved birth outcomes (Fiscella, 1995). Dowswell et al. (2010) wrote that women with low-risk pregnancies who only visited their provider four times in pregnancy had no worse outcomes than women with the standard care package.

Nurse-midwives provide prenatal care to roughly 8% of pregnant women in the United States (Hamilton et al., 2014). Prenatal care is becoming an increasing burden on the federal government as well with nearly 40% of prenatal care being covered by Medicaid (Krans & Davis, 2014). The responsibility for providers to identify fiscally responsible and effective means to provide care to their patients is of growing importance.

The lack of improvement in birth outcomes, even with improved prenatal care attendance, leaves providers with the clear answer that solely relying on the quantity without changing the quality of prenatal care is not the answer. Will a change in prenatal care be the difference for birth outcomes and maternal health? Whether the answer is yes or no, an effort must be put forth. In1985, the Institute of Medicine (IOM) challenged national leaders in both the public and private sectors to "commit themselves openly and unequivocally to designing a new maternity care system . . . dedicated to drawing all women into prenatal care and providing them with an appropriate array of health and social services throughout pregnancy, childbirth and the postpartum period" (Institute of Medicine, 1988, p. 137). Yet, even with the increasing rates of low birth weight infants over the past 25 years, the obstetric community has ignored this call.

The American College of Nurse Midwives Board of Directors (2016) encouraged midwives to implement evidenced-based models of group prenatal care, advocate for enhanced third-party reimbursement for group care, and continue to lead and participate in research exploring implementation of group care (p. 1). Nurse-midwives cannot ignore the importance of acknowledging, implementing, and advocating for other options of prenatal care.

Significance to Nurse-Midwifery

Midwives are on the forefront of maternity care around the world. In many countries they provide the majority of prenatal care to low-risk women. Nurse-midwives have a strategic influence in the maternity care setting to implement change. One woman in particular found herself on the forefront of incorporating scientific evidence into clinical practice. Schindler Rising took it upon herself to create a new way of providing maternal care through Centering Pregnancy (Massey et al., 2006). She saw the lack of evidence and lack of quality outcomes in the current traditional model and began implementing change in 1993. It is time that these new methods be evaluated and that midwives around the world take part in promoting and implementing methods and care that empower women, promote health, and are evidenced by improved birth and maternal outcomes.

Theoretical Framework

Group prenatal care was initiated to improve birth outcomes for women and to take advantage of the vital gateway that prenatal care serves for ongoing health care for women. Centering Pregnancy, this revolutionary prenatal care model, is built around themes of the Social Cognitive Theory, which, in summary, explained how people establish certain behavioral patterns and how providers can incorporate effective intervention strategies (Bandura, 1999). Specifically, the Social Cognitive Theory lends itself to the idea that self-efficacy is the driver of

individual change and it can be built through a handful of means (Bandura, 1999). This paper discusses how group prenatal care utilizes the Social Cognitive Theory tenet of self-efficacy. It will further describe how self-efficacy is built by group prenatal care's ideals of sharing knowledge, modeling, and proving care in a social context to improve maternal and infant health outcomes.

Self-efficacy is rooted in the belief that one has the power to produce desired changes by one's actions. If people do not believe they can produce desired effects by their actions, they are unlikely to show resilience in the face of difficulty nor are they likely to have personal incentive to act or change a behavior (Donaldson, 2006). Self-efficacy is the center of personal motivation and action. The Social Cognitive Theory builds itself around the idea of self-efficacy and the factors that contribute to it in a person's life.

Group prenatal care hinges on the importance of building self-efficacy in women. Aligning itself with the Social Cognitive Theory, group prenatal care emphasizes factors that build knowledge and provide avenues for social support, shared ideas, and modeling throughout a woman's care experience. By building self-efficacy, women are more likely to choose health-promoting behaviors for themselves and for their unborn children. Not only will the self-efficacy built during prenatal care affect them in this pregnancy, but their increased self-esteem built on mastery and improved health behaviors will also continue with them as they begin motherhood, and it will reach into future pregnancies (Bandura, 2004).

Women are more than consumers in their group prenatal care classes. They partake in their health by learning how to check their own weight and record their own blood pressure. They participate in group dialogue and information sharing, both gaining knowledge from the group and contributing to it. All of these factors help to promote self-efficacy.

Growing in knowledge is one of the foundational principles of growing in self-efficacy. If women lack knowledge about how their lifestyle habits affect their health they will not know what they should do to improve their health, or how to change their habits to promote health. The knowledge of what is healthy is only the beginning. People need tools to overcome habits that have been in their lives for years. People need the belief that they are capable of changing along with the skills to overcome difficulties along the way (Bandura, 1999). Knowledge in all of these areas increases the desire to change and to believe change is possible. People can feel stressed and depressed by their lack of health and feel overwhelmed with the task at hand; however, by giving them tools to achieve success, they will have improved self-efficacy and therefore improved outcomes (Donaldson, 2006).

During group prenatal care, sharing knowledge is the focal component of each class. Groups discuss nutrition, early pregnancy concerns, self-care, substance abuse, preparation for childbirth, adaptation to the postpartum period, infant feeding, contraception, and parenting, among other topics. The women obtain knowledge on these topics, and discuss their own goals and plans for their families to reach optimal health. Women are able to understand how certain behaviors lead to good or bad outcomes and are able to change their lifestyles to promote positive health change for their families (Konuk Sener & Cimete, 2016).

Group prenatal care has the unique ability to use modeling and a group dynamic to improve outcomes. Models and peers are sources of aspiration, competencies and motivation. Watching people succeed who are in similar situations increases the observers' belief that they can succeed as well (Donaldson, 2006). Social persuasion and encouragement are important influences on self-efficacy (Bandura, 2004). The thought behind modeling as a tool to promote self-efficacy is that modeling enables people to learn without having to go through the hard trial-

by-error themselves; instead, people are able to learn through each other's mistakes and victories. It promotes personal and social change by instructing, motivating, and prompting. As individuals share their experiences the listeners gain knowledge of what worked and what did not work and they gain courage. Participants in the group are challenged to make behavioral modifications as they watch their peers do so. Listeners are also stirred or challenged to improve their own health and make steps themselves as humans often change their behaviors so that they are socially accepted (Donaldson, 2006). Bandura (1999) discusses that self-efficacy is built not only when one performs a task successfully themselves, but also when people witness other people performing a task successfully, or when they receive verbal encouragement from others.

Group prenatal care utilizes the idea that health promotion can be achieved by building self-efficacy through receiving prenatal care in a group context. Group care is unlike any other form of prenatal care. As women share in the same care setting for 13 weeks they have the unique opportunity to learn from one another's failures and successes. Women have the space to encourage and support one another. Self-efficacy is achieved as women carve out a special time in their lives and create a social network where they are able to focus on their own health and well being in a positive environment.

In conclusion, the Social Cognitive Theory supports the use of group prenatal care to promote optimal outcomes for mothers and babies by promoting a woman's self- efficacy. Group prenatal care values education and ensures women are equipped with tools they need to succeed. Not only are women able to learn these skills individually, they are able to learn from each other. They are empowered by sharing their own stories and encouraging one another and learning from each others' experiences. Self-efficacy is vital for behavioral change and group prenatal care is a model for promoting this foundational key in the prenatal period.

Summary

Neonatal outcomes have not improved over the past 30 years in spite of increases in funding for and utilization of prenatal care. New models of prenatal care such as Centering Pregnancy need to be evaluated for effectiveness in birth outcomes, maternal health, and adequacy of care. This chapter described the history of prenatal care, the lack of research promoting the traditional model utilized today, the need for further review of the literature, and the significance to midwifery and a theoretical framework supporting the review.

Chapter 2 will describe the methods used for the review of the literature, the search strategies utilized, inclusion and exclusion criteria for articles included in the review, as well as criteria for evaluating research studies. Chapter 3 discusses the evidence found and provides further analysis to consider as it relates to the traditional model of prenatal care. It also includes a synthesis of conclusions found in the literature as well as describes strengths and weaknesses of the studies. In the final chapter, the research question will be answered based on the synthesis of the literature. Trends and gaps in literature, implications for midwifery, and ideas for further research will also be addressed.

Chapter II: Methods

This chapter will discuss the methods used to obtain articles included in this literature review. Search strategies used to identify research studies will be discussed, as well as inclusion and exclusion criteria. Also included will be the numbers and types of studies included and the criteria used for evaluating research studies.

Search Strategies

Articles were obtained through literature searches. The initial search was on the Cumulative Index to Nursing and Allied Health Literature (CINAHL) database using the key words of group prenatal care and outcomes, 1,129 articles, published between 1987 and 2017 were retrieved. A second search on Scopus database using the key words Centering Pregnancy or group prenatal resulted in 103 articles published between the dates 2013 and 2017. A third search on Google Scholar using the words Centering Pregnancy and adequacy resulted in 1,970 articles published from 1967 until 2017. Reducing the date of study to the years 2012 to 2017 yielded 602 articles in Google Scholar, 43 on Scopus and 403 in CINAHL. Data mining was also used to acquire articles relevant to the question.

Inclusion and Exclusion Criteria

A significant number of qualitative articles found during the literature search were not included in the matrix as they were irrelevant to the question, or they addressed patient satisfaction and did not address outcomes, maternal weight gain, or adequacy of care; however they were reviewed to obtain references. Psychosocial outcomes were not included in this study as there were not enough articles that were conclusive to merit further review. Studies that measured group prenatal care outcomes, including gestational age at birth, birth weight, type of birth, and postpartum family planning were added. Also included were articles discussing the

effects of group prenatal care on maternal weight gain and adequacy of care. Articles published between 2007 and 2016 were included in the review, as well as one article of high quality that was published in 2003 that was significant as the population studied was larger than most and it specifically measured gestational age and weight at birth. One other study, published in 2004, was included because it specifically measured teen pregnancy, which was significant for looking at how group prenatal care affects that subgroup. Experimental, quasi-experimental, and non-experimental research studies were included in the review, including those of low quality, to ensure an adequate sampling of articles for this review. Literature reviews, meta-analysis, and expert opinion articles were not included in the matrix but were reviewed for data mining.

Summary of Studies Selected for Review

After review of the articles obtained in literature searches, 24 were selected to be included in the matrix. Studies were organized as experimental, quasi-experimental, and non-experimental. There were six experimental studies included, four quasi-experimental and 14 non-experimental studies. The studies were further broken down into the following: randomized controlled trials, retrospective cohort studies, prospective matched cohort studies, descriptive studies, prospective observational cohort study, pre-post test comparative studies, as well as correlational-cross sectional designs. The studies that were included in the literature review are displayed in the matrix (see Appendix 1), with additional information displayed in Table 1.

Criteria for Evaluation of Research Studies

Research studies were evaluated using the John Hopkins Research Evidence Appraisal Tool (Dearholt & Dang, 2012). This tool analyzed the level and grade of the evidence. Each article was analyzed using this tool and identified as either Level I, Level II, or Level III, with a grade of high quality, good quality, or low quality. Evidence of studies identified as Level I were

either randomized controlled trials, experimental studies, or a systematic review of randomized controlled trials. Level II evidence suggested that the evidence was quasi-experimental. Evidence discovered by means of non-experimental studies was determined to have Level III evidence.

The quality of the study design was categorized as high, good, or low quality (Dearholt & Dang, 2012). High quality designs have consistent, generalizable results with sufficient sample sizes for their study design. These studies also have adequate control of variables and strong definitive conclusions. They have consistent recommendations including extensive literature reviews. Good quality designs have consistent results with sufficient sample sizes. These studies have some control over the variables and establish fairly definitive conclusions with rather consistent recommendations that have been reached through a decent literature review. Low-quality designs are found to have little evidence with inconsistent results, generally with insufficient sample sizes, with conclusions that cannot be drawn (Dearholt & Dang, 2012).

Summary

In summary, 24 articles were selected for the literature matrix for a thorough evaluation of evidence using key word searches on multiple databases and sifting through the articles to determine which answered the research question relating to group prenatal care and how it affected birth outcomes, maternal weight gain, and adequacy of care. From the articles selected, there were six articles with John Hopkins' Level I strength evidence, three with Level II strength evidence, and 15 articles with Level III strength evidence. This chapter discussed how articles were found and selected, and evaluated the strength of the evidence. The following chapter will provide a review and analysis of the literature.

Table 1: Levels of Evidence

Strength of Evidence	Quality of Evidence: High	Good	Low
Experimental	2	4	0
Quasi-experimental	1	0	2
Non-experimental	1	7	6

Chapter III. Literature Review and Analysis

This chapter includes a review and analysis of literature concerning group prenatal care and the effect it has on pregnancy outcomes, maternal weight gain, and adequacy of care. Pregnancy outcomes discussed will be gestational age at birth, birth weight, behavioral risk, and family planning postpartum. This chapter will also summarize how group prenatal care affects outcomes, maternal weight gain, and adequacy of care, particularly for at-risk populations such as adolescents, and African American and Hispanic women. Furthermore, strengths and weaknesses of the evidence will be determined.

The Matrix

Each article was reviewed, and the purpose, sample, design, measurement, results, recommendations, level, and quality were determined and documented on the matrix. Articles represented research in the United States and Iran from public clinics, university hospitals, and navy hospitals, and ranged in sample size from 49 to 6,155. The matrix outlining this information is included in appendix A.

Major Findings

Birth outcomes. Outcomes specifically reviewed in this literature pertained to gestational age at birth, birth weight, maternal behavioral risk, as well as postpartum family planning.

Gestational age at birth. Gestational age is an important outcome to measure the health and well being of a pregnancy. Adverse outcomes from preterm birth are striking. Infants born prematurely may suffer from low birth weight, requiring neonatal intensive care unit admission, and they also have higher risks of serious disability and mortality (Center for Disease Control and Prevention, 2015). Not only that, but hospitalization costs of a preterm infant are nearly

double that of a term infant (Petrou, Sach & Davidson, 2001). Multiple articles in this literature review included evidence that indicated the incidence of preterm births was decreased in women who participate in group prenatal care (Gareau et al., 2016; Grady & Bloom, 2004; Ickovics et al., 2007; Picklesimer et al., 2012). Gareau et al. (2016) with N = 6,328 in a five year retrospective study, found that participating in group prenatal care reduced the risk for premature birth by 36% compared to traditional care ($p<0.05$), which is statistically significant (p. 1384). In a randomized controlled trial with 1,047 participants, the incidence of preterm birth was 9.8% in women participating in group prenatal care, compared to 13.8% in the traditional model. This was statistically significant with a p value of 0.045 (Ickovics et al., 2007). Picklesimer et al. (2012) N = 4,083, noted that only 7.9% of women in group prenatal care had preterm births whereas 12.7% of women had preterm births in traditional care ($p = 0.01$).

Birth weight. The infant's weight at birth is another important marker when considering the impact of prenatal care. According to The March of Dimes (2014), one in 12 babies born are considered low birth weight. Low birth weight babies weigh less than 2500 g. Low birth weight babies are also at greater risk for respiratory distress syndrome, intraventricular hemorrhage, and necrotizing enterocolitis (March of Dimes, 2014). Women participating in group prenatal care have a 44% lower relative risk of low birth weight infants by those in traditional care ($p<0.05$) (Gareau et al., 2016). Additionally, Ickovics et al. (2003) demonstrated in a matched cohort study N=458, women in group prenatal care had greater birth weights ($p<0.01$), and furthermore, those with infants born prematurely had greater birth weights than those born prematurely in traditional care ($p<0.05$). In one randomized control trial with N = 678, infants with mothers in group prenatal care were also less likely to have intrauterine growth restriction ($p<0.011$) (Jafari & Eftekhar, 2010).

Behavioral risk. Women were more likely to have healthy behaviors throughout pregnancy in group prenatal care. In one study of 3637 women, researchers found that women in group prenatal care were less likely to smoke during pregnancy ($p<0.05$) (Hale, Picklesimer, Billings & Covington-Kolb, 2014). Women were more likely to take vitamins (Jafari & Eftekhar, 2010). In a smaller study of 125 women, group care participants were less likely to be exposed to dangerous substances and more likely to avoid risky sexual practices (Shakespear, Waite & Gast, 2009). In a prospective chart review N= 165, women in group care with gestational diabetes were also less likely to need to be treated with insulin than those participating in the individual care model ($p<0.001$) (Mazzoni, Hill, Webster, Heinrichs & Hoffman, 2015).

Family planning postpartum. Rapid repeat pregnancy and the use of postpartum family planning is another outcome measured to evaluate prenatal care. Over the last ten years, the effect of group prenatal care on family planning has been evaluated by researchers. However, authors have found that family planning postpartum is increased amongst women who participate in group prenatal care ($p<0.05$, $p=0.047$) (Hale et al., 2014; Smith, 2016); women have an increased likelihood of having some sort of family planning in place by two months postpartum ($p = 0.013$) (Jafari & Eftekhar, 2010). In another study N=876, women who participated in group prenatal care were also found to be more likely to use a long-acting reversible contraception (LARC) method ($p = 0.014$), showing it is statistically significant (Smith, 2016).

Maternal Weight Gain. Maternal obesity and excessive weight gain in pregnancy can lead to fetal anomalies, gestational diabetes, preeclampsia, cesarean delivery, macrosomia, asphyxia, and stillbirth (Cnattingius, Bergstrom, Lipworth, & Kramer, 1998). In 2009, the Institute of Medicine published target gestational weight gain recommendations. Researchers in 2009 began to study whether group prenatal care impacts maternal weight gain in pregnancy.

Only one study in this review included a diverse sample of women; the others were primarily looking at specific sub group populations, which will be discussed later in this chapter. In the one study that included a diverse population with a group participant sample of 65 and traditional care sample of 130, there were no differences in maternal weight gain between the two groups with 9.6% of women in group care gaining more than the recommended amount of weight and 10.6% in traditional care (p=.24) (Brumley, Cain, Stern, & Louis, 2016). The study was limited by a small sample size.

Adequacy of Prenatal Care. The adequacy of prenatal care is most often measured by researchers with the Adequacy of Prenatal Care Utilization (APNCU) Index, also known as the Kotelchuck Index. The index measures adequacy of care by using the date of the first prenatal visit, the total number of prenatal visits, and gestational age at birth (Kotelchuck, 1994). Researchers found in a retrospective cohort study N = 6,704, that adequacy of prenatal care is higher for women in group prenatal care ($p<0.05$) (Hale et al., 2014). The difference was highlighted in a study of 678 women in a randomized control trial in Iraq where 70.3% of women received adequate care in the group prenatal sample and only 37.3% of women in the traditional sample received adequate care ($p<0.001$) (Jafari, Eftekhar, Mohammad, & Fotouhi, 2010). In a three year, longitudinal randomized controlled trial N = 322, Kennedy et al. (2011) found that 46.7% of women in traditional care were likely to have less than nine visits with a provider, whereas only 12.9% of women in group care had fewer than nine visits with a p value of <0.0005, showing it was a statistically significant difference in women receiving adequate care. An additional study found that there was greater prenatal attendance for women in group prenatal care than women who experienced the traditional model (Shakespear, Waite & Gast, 2009).

At Risk Populations. African Americans, adolescents, and Hispanics are all at increased risk of inadequate prenatal care and poorer birth outcomes (Iyasu, Tomashek & Barfield, 2002). This paper will analyze the literature surrounding group prenatal care and its affect on these populations.

African American women. African Americans have higher infant mortality rates and more adverse outcomes than do white women (Iyasu, Tomashek, & Barfield, 2002). For this reason, it is especially important that prenatal care is associated with decreased adverse outcomes in this population. African American women participating in group prenatal care attended more prenatal visits ($p<0.05$) and had fewer no shows at appointments (19% v. 28%, N = 377) than women in the traditional care model (Grady & Bloom, 2004; Klima, Norr, Vonderheid, & Handler, 2009). Preterm births among women in group prenatal care were significantly decreased in multiple studies ($p<0.02$, N=268) (Grady & Bloom, 2004; Ickovics et al., 2007). Infants were less likely to be low birth weight ($p<0.02$) (Grady & Bloom, 2004), and overall had higher birth weight than the traditional care model ($p<0.05$) (Ickovics et al., 2003). African American women (N= 393) in group prenatal care were less likely to gain excessive weight in pregnancy ($p=0.04$) (Tanner-Smith, Steinka-Fry, & Gesell, 2014).

Adolescents. Adolescents who are pregnant come with their own specific categories of risk and most fall within at least one of these categories: bearing children at an early age, being in a low socioeconomic status, being poorly educated, and being unmarried. Adolescents also may have poorer health habits and may seek limited or no prenatal care. Due to all of these increased risks, prenatal care is an important aspect of these women's wellbeing in pregnancy. According to Grady & Bloom (2004), adolescents in group prenatal care had fewer no-show rates at prenatal visits, fewer preterm births, and fewer low birth weight infants than those in

individual prenatal care (p. 416). This is compelling evidence towards using group prenatal care for adolescents, considering that low birth weight infants and preterm births are more common among adolescents (Grady & Bloom, 2004). Ickovics et al. (2016) echoed these results when through a randomized controlled trial she discovered that adolescents in group prenatal care had fewer small for gestational age SGA babies than those in individual care models ($p=0.04$). Adolescents may also be at increased risk for excessive weight gain in pregnancy (Grady & Bloom, 2004). In their study, Magriples et al. (2015) found that in 1233 adolescents, group prenatal care participants were more likely to remain within 10 pounds of the recommended Institute of Medicine weight gain guidelines than those in traditional prenatal care ($p<0.0001$). Additionally, behavioral risks were reduced in group prenatal care; the researchers found that incidences of unprotected sex were fewer than those in individual care ($p<0.01$) (Ickovics et al., 2016), and that more women used long-acting reversible contraception postpartum than those in the traditional group ($p=0.03$) (Trotman et al., 2015).

Hispanics. Hispanics are a minority population and therefore are at similar risk as African Americans and adolescents for not receiving adequate prenatal care (Iyasu, Tomashek, & Barfield, 2002). This paper will look at the literature to discover how group prenatal care affected outcomes for Hispanic women and children. Hispanic women participating in group prenatal care were found to have greater birth weights ($p<0.01$) (Ickovics et al., 2003) and a statistically significant decrease in preterm births ($p=0.04$) (Tandon Cluxtn-Keller, Colon, Vega, & Alonso, 2012). In a study of Hispanic women ($N=460$), those participating in group care had increased adequacy of prenatal care ($p=0.008$), along with decreased no-show rates ($p=0.01$) (Schellinger et al., 2016). Women in group care ($n=198$) were also more likely to return for their six-week postpartum appointment than those receiving traditional prenatal care ($n=92$) ($p=0.04$)

(Tandon Cluxton-Keller et al., 2013). Hispanic women in group prenatal care diagnosed with gestational diabetes were more likely to be diet controlled rather than requiring insulin to manage their diabetes than those in traditional care ($p<0.001$; $p=0.009$) (Mazzoni et al., 2015; Schellinger et al., 2016).

Conflicting Research

Although the majority of the literature discussed positive birth outcomes, adequacy of prenatal care, and decreased behavioral risk, as well as compliance to recommendations for maternal weight gain, few studies showed differing results. There were four studies wherein researchers found no significant difference in gestational age between the two comparison groups; however, there were no studies that showed group prenatal care had increased incidences of preterm birth (Brumley et al., 2016; Ickovics et al., 2003; Kennedy et al., 2011; Mazzoni et al., 2015).

The majority of studies showed that group prenatal care had decreased low birth weight infants; only two studies showed that group prenatal care made no difference in birth weight. However, no studies indicated that traditional prenatal care had a better impact on birth weight. Looking at health behaviors, only one author concluded there was no difference in improved health behaviors in pregnancy between the two groups (Shakespear, Waite, & Gast, 2010). Maternal weight gain is an increasing area of research for group prenatal care and many authors found that women were more likely to comply to IOM recommendations; however, in one study, researchers looked at a case cohort study with a sample size of 195 women and concluded there was no significant difference in maternal gestational weight gain between the two groups (Brumley et al., 2016).

Women in at-risk populations strikingly benefitted from group prenatal care. However, in two separate studies of African women, the researchers noted that there was no difference in infant birth outcomes (Ickovics et al., 2003; Tanner-Smith et al., 2014). Interestingly, authors did identify that although no difference was noted in birth weight or prematurity, infants who were born prematurely were more likely to be carried two weeks longer in group prenatal care (Ickovics et al., 2003). Likewise, there were no studies that showed that traditional care had better outcomes for adolescents, and in one study researchers noted there was no difference in adequacy of care between the two groups (Ickovics et al, 2016). Trotman et al. (2015) found no difference in gestational age at birth between the two groups. In six studies where researchers looked specifically at Hispanic women, it was concluded that group prenatal care improved birth outcomes; three studies showed that there were no differences in gestational age at birth (Robertson, Aycock, & Darnell, 2009; Schellinger et al., 2016; Trudnak, Arboleda, Kirby, & Perrin, 2013) or significant differences in birth weight (Robertson et al., 2009; Tandon et al., 2013; Trudnak et al., 2013).

Strengths and Weaknesses

The quality of the evidence reviewed was good overall, limited by six non-experimental and two quasi-experimental studies of low quality due to small sample sizes, based on the John Hopkins Evidence Appraisal Tool. Strengths included six randomized controlled trials with both good and high quality evidence with adequate sample sizes.

Limitations of the research included lack of randomization and small sample sizes. Researchers found it difficult to randomize people to group prenatal care, and if the study was not randomized, the results may have been biased, as those who chose group prenatal care may have been more motivated to change behaviors and comply with recommendations than those in

the traditional model. Studies of low quality had small sample sizes and therefore it was hard to conclude if there was a significant difference in results between the two groups. Studies of increased diversity would make the results more generalizable, as current research focuses much of the studies on low-income and at-risk populations. Women with higher risk pregnancies including those with gestational diabetes (GDM), obesity, and hypertension may benefit the most from group prenatal care, and current research does, not include them in sample sizes.

Summary

The literature review consisted of 23 research studies that assessed the effects of group prenatal care in pregnancy and postpartum. The John Hopkins Research Appraisal Tool was utilized to assign levels of evidence to the research. There were three articles with high quality evidence, 11 with good quality, and eight with low quality. Quality was affected largely by small sample sizes. Evidence revealed that group prenatal care positively affects birth outcomes, maternal weight gain, and adequacy of prenatal care in the general population as well as in at-risk groups. Group prenatal care is a good alternative method of prenatal care for women.

Chapter IV: Discussion, Implications, and Conclusions

The purpose of this literature review was to determine the effects of group prenatal care on birth outcomes, maternal weight gain, and adequacy of prenatal care. There were 24 scholarly articles chosen for this review of literature. By thoroughly appraising the studies included, implications for nurse-midwifery practice as well as limitations in current research were discovered. This chapter discusses suggestions for midwifery practice consistent with evidence from the literature review, offers recommendations for future research, and concludes with the integration and application of the Social Cognitive Theory in regard to evidence found in this review.

Literature Synthesis

This literature review focused specifically on group prenatal care and its effect on birth outcomes, maternal weight gain, and adequacy of care. Birth outcomes such as gestational age at birth, birth weight, behavioral risk aversion, and postpartum family planning were identified in the literature. Maternal weight gain was used as a measure of the effectiveness of group prenatal care. Finally, adequacy of care, including no-show rates and postpartum appointment attendance, was included in the review. At-risk populations were specifically studied by researchers and were further broken down into sub groups to evaluate outcomes of group prenatal care on the participants' pregnancy outcomes.

Current Trends

Current trends in the literature surrounding group prenatal care and its effect on pregnancy will be discussed. Group prenatal care has been around since the 1990s and trends in the literature primarily focused on birth outcomes for the first few years since its inception. Researchers specifically studied how group prenatal care affected birth weight and gestational

age. As evidence regarding group prenatal care was published, researchers continued to conclude that group prenatal care consistently improved birth outcomes (Gareau et al., 2016; Ickovics et al., 2003; Ickovics et al., 2006; Jafari & Eftekhar, 2010; Picklesimer et al., 2012). Mothers in group prenatal care were found to have decreased likelihood of having their infants be born prematurely (Gareau et al., 2016; Grady & Bloom, 2004; Ickovics et al., 2007; Ickovics et al., 2016; Picklesimer et al., 2012). Infants were also less likely to be low birth weight if mothers participated in group prenatal care (Grady & Bloom, 2004; Ickovics et al., 2016; Jafari & Eftekhar, 2010).

The studies further indicated its effect on maternal behaviors in pregnancy and decision to use postpartum family planning as measures of birth outcomes. Researchers showed that the utilization of postpartum family planning increased and that there are improved maternal behaviors (e.g., not smoking in pregnancy, likelihood of taking prenatal vitamins, diet-controlled gestational diabetes that does not require insulin, minimized exposure to dangerous substances and risky practices) in pregnancy when mothers participate in group prenatal care (Hale et al., 2014; Jafari & Eftekhar, 2010; Mazzoni et al., 2015; Shakespear, Waite, & Gast, 2009; Smith, 2016). Many studies have also been focused on the adequacy of prenatal care based on the Kotelchuck Index (Kotelchuck, 1994).

In more recent years, the focus of research has been on maternal weight gain in pregnancy and how participants in group prenatal care complied with the Institute of Medicine's (IOM) recommended weight gain guidelines in pregnancy compared to those in individual care. There have been few studies in the general public regarding maternal weight gain, and the one that has been done used a small sample size (Brumley et al., 2016). Researchers conducting those studies did not find a significant difference in maternal weight gain in the two groups, according

to IOM guidelines (Brumley et al., 2016). However, in at risk populations, Magriples et al. (2015) and Trotman et al. (2015) found that adolescents gained less weight in pregnancy when participating in group care and were more likely to stay within IOM guidelines. However, there has been conflicting evidence for improvement of maternal weight between the groups. In one study of African-American women, those in group prenatal care gained more weight than those in individual care: 32.2% versus 28.5%, respectively, both within IOM guidelines of weight gain for an average woman. Further, this study was also limited by a small sample size (Klima et al., 2009).

Researchers also investigated whether group prenatal care impacted specific at-risk populations in the same positive way that it affected the general population and they found that the benefits may be more pronounced in at-risk groups. African Americans participating in group care had an 8.9% incidence of low birth weight babies, compared to 22.9% in individual care (Grady & Bloom, 2004). Adolescents participating in group care were more than twice as likely to use a long-acting reversible contraception option postpartum if they were in group prenatal care (Trotman et al., 2015). Finally, 5% of Hispanic babies of mothers in group care were born prematurely, compared to 13% in traditional care (Tandon et al., 2012). Researchers have also investigated patient satisfaction with group prenatal care as compared to the individual model, however, there were not enough studies to include in this review.

Furthermore, besides the evidence discussed above regarding maternal weight gain in pregnancy, there has been no other research where authors found better outcomes in individual prenatal care. There were several studies that showed no difference in birth outcomes between group prenatal care and individual care (Brumley et al., 2016; Kennedy et al., 2011; Klima et al., 2009; Mazzoni et al., 2015; Robertson, Ayock, & Darnell, 2009; Schellinger et al., 2016;

Trotman et al., 2015; Trudnak et al., 2013). All but one of these studies was Level 3 quality, according to the John Hopkins Evidence Rating scale, and the one Level 1 quality had a small sample size. In summary, there is a lack of evidence to show that the current model of individual prenatal care has superior outcomes to a group prenatal care model.

Gaps in the Literature

The greatest need in current literature is for randomized controlled trials with larger sample sizes. Until recently when evidence have shown positive outcomes from group prenatal care, researchers felt it was unethical for participants to be randomized into group prenatal care due to the societal expectations surrounding the current traditional model and the fact that there was no research to support the benefits of group care (Novick, 2004). Research has not clearly demonstrated the benefits of group prenatal care. Currently, there are several studies that show no difference in birth outcomes between the two groups, yet they are limited by small sample sizes (Brumley et al., 2016; Klima et al., 2009; Mazzoni et al., 2015; Robertson et al., 2009; Shakespear, Waite, & Gast, 2009; Tandon et al., 2012; Trotman et al., 2015). With smaller sample sizes it is difficult to draw conclusions. The evidence showing that outcomes associated with group prenatal care are just as good, if not better, than individual care, increases the likelihood of larger randomized controlled trials within the general population. This will give higher quality evidence that is not limited by the bias created when participants self-select the group in which they will participate.

Research has also not been completely generalizable as many studies are focused on target populations (e.g. at risk populations and military families) and not the general public. There is a need for studies with larger and more diverse sample sizes.

Furthermore, researchers are also beginning to look at psychosocial outcomes, such as the mother's perception of preparedness for childbirth and postpartum depression, as well as trying to determine if social support and group participation will positively impact outcomes. Researchers have found decreased postpartum depression in women with group prenatal care (Heberlein et al., 2015; Kennedy et al., 2011), however there is a need for more studies with larger sample sizes.

The cost analysis of group prenatal care is another important aspect that has limited data up to this point. Ickovics et al. (2007) noted that there was no difference in cost between the two care models. There is a need for further research in this area.

Implications for Midwifery Practice

Midwifery is founded on the hallmarks of incorporating scientific evidence into clinical practice, empowering women as partners in health care, providing health education, and promoting a public health care perspective (ACNM, 2012). According to the evidence this literature review discovered, it is the responsibility of nurse-midwives to implement group prenatal care in their midwifery practices. If evidence showed that x, y, or z interventions improved birth outcomes, according to the Core Competencies of Nurse-midwives, it would become standard to implement the practice (ACNM, 2012). Group prenatal care has shown to improve birth outcomes, improve maternal weight gain consistency with IOM Guidelines, and improve adequacy of prenatal care. The evidence demonstrates the need for nurse-midwives to act on and implement evidence regarding prenatal care and make it a greater priority to implement group care into their practice, as well as prioritize leading and participating in research studies on group prenatal care.

The question, then, is why is it not becoming standard practice to implement group prenatal care into practice? Providers have found some challenges as they put this model into practice, such as difficulty in recruiting women into group prenatal care, challenges with improper scheduling, difficulties with coordinating lab services, and obtaining medical records (Klima, Norr, Vonderheid, & Handler, 2009). The lack of flexibility in the clinic schedule for groups is another reason why some women are not able to participate (Tilden et al., 2014). Additionally, it is estimated if group size is less than eight people group care is not cost-effective (Tilden et al., 2014). However, Tilden et al. (2014) concluded that when a clinic has an adequate volume of obstetric patients and can create interest in the group, there are financial benefits from increased patient capacity and improved efficacy when group prenatal care is implemented in a practice.

Group prenatal care provides an environment that empowers women to be participants in their own health care by teaching them to monitor their own blood pressure and their own weight gain. Not only do women participate in their individual care, but there is ample time during each class for women to ask and answer one another's questions, promoting health education and self-efficacy. The group model of care also has shown to benefit women in at-risk populations, which promotes the public health perspective of nurse-midwives (Grady & Bloom, 2004; Ickovics et al., 2003; Ickovics et al., 2007; Ickovics et al., 2016; Klima et al., 2009; Magriples et al., 2015; Robertson et al., 2009; Schellinger et al., 2016; Tandon et al., 2013; Tandon et al., 2012; Tanner-Smith et al., 2014; Trotman et al., 2015; Trudnak et al., 2013).

Future Research

Research in the past 15 years has produced growing evidence that group prenatal care produces better birth outcomes than the traditional model of care. Currently, research is focused

on the cost-effectiveness of group prenatal care in comparison to individual care models, in addition to looking at pregnancy outcomes in group prenatal care with higher-risk pregnancy participants. Furthermore, for nurse-midwives to incorporate group prenatal care into their practices, it is important to investigate cost effectiveness and to determine if it is within their budgets to implement it. Money speaks, and if group prenatal care were proven to be more cost-effective than individual prenatal care, more practices and organizations would look at implementing this model. Increased evidence for the cost-effectiveness of group prenatal care would support the already existing evidence that group prenatal care could very well be an improved alternative to the individual care model.

It would also benefit researchers to study provider satisfaction with group prenatal care. This would help other providers discover personal career benefits from taking this step. Some researchers have found providers' experience with group prenatal care as much "more" or "richer" than traditional care (McNeil et al., 2013, p. 4). This may spur others on to try something new.

Finally, as discussed regarding the gaps in the literature, more randomized controlled trials with larger sample sizes are necessary to see group prenatal care ultimately implemented into practice. Randomized controlled trials that look not only at birth outcomes, but also at behavioral changes, maternal weight gain, psychosocial factors, and patient and provider satisfaction are all important. There are currently six randomized controlled trials in the literature; an increased number of studies would add strength to the already existing evidence.

Integration and Application of the Social Cognitive Theory

Group prenatal care is unique in that it creates an environment where women find social support with others in similar life stages; they are empowered to participate in their own health

care, and they receive and share information with others. All of these characteristics promote self-efficacy, which, according to the Social Cognitive Theory, is the driver of individual change (Bandura, 1999).

Through the group care model, women can be participants in their health care rather than mere consumers. Their health care is not based solely on the care of their provider, but it is founded on self-efficacy through their participation, acquisition of knowledge, and their desire to make choices for promoting healthful behaviors in their own lives. They grow in knowledge by the valuable topics discussed in group sessions, as well as from the life experiences modeled by others in the group. This literature review has revealed that group prenatal care improves birth outcomes, maternal weight gain, and adequacy of prenatal care, indicating that this environment builds self-efficacy and improved maternal health behaviors in alignment with the Social Cognitive Theory (Bandura, 1999). Women in group prenatal care learn from one another, encourage one another, and support one another. Group prenatal care supports self-efficacy in a way that is unique to prenatal care, building knowledge and experience, sharing tools, and providing encouragement to promote the best outcomes for mothers and newborns in the perinatal period.

Conclusion

This critical review of literature discovered that group prenatal care improves birth outcomes, promotes maternal weight gain consistent with IOM guidelines, and increases adequacy of care. Infants were more likely to be born at later gestational ages (Gareau et al., 2016; Ickovics et al., 2006; & Picklesimer et al., 2012) and with higher birth weights (Gareau et al., 2016; Ickovics et al., 2003; Jafari & Eftekhar, 2010) than those in traditional care. Mothers were more likely to use contraception postpartum, and of particular note, more women chose a

long-acting reversible contraceptive method (Hale et al., 2014; Jafari & Eftekhar, 2010; Smith, 2016). With greater self-efficacy built in group prenatal care, women chose healthier behaviors in pregnancy, which supported improved outcomes (Hale et al, 2014; Jafari & Eftekhar, 2010; Mazzoni et al., 2015; Shakespear, Waite, & Gast, 2009). With the help of social support, additional education, and other tools provided during sessions, weight gain was more consistent with IOM guidelines in group prenatal care participants (Brumley et al., 2016; Magriples et al., 2014; Tanner-Smith et al., 2014). A social support network provides accountability, and women were less likely to miss appointments when participating in group prenatal care (Jafari et al, 2010; Kennedy et al., 2011; Shakespear, Waite, & Gast, 2009).

The Social Cognitive Theory discussed how self-efficacy is the key tool for change (Bandura, 1999). Self-efficacy is built on the practices that are exhibited in the group prenatal care model. According to the evidence shown, nurse-midwives should be responsible for implementing this research into practice and understanding the urgency of the issue. The maternal and infant outcomes in the U.S. are not improving with the current model of individual care. Based on this literature review, researchers have shown that the group prenatal care model can be a viable alternative. For the well-being of families, nurse-midwives need to implement the group prenatal care model into practice, and they also need to work towards eliminating the gap in literature related to this practice.

References

Alexander, G. R., & Kotelchuck, M. (2001). Assessing the role and effectiveness of prenatal care: History, challenges, and directions for future research. *Public Health Reports, 116*(4), 306-316. Retrieved from https://doi.org/10.1093/phr/116.4.306

American College of Nurse Midwives Board of Directors. (2016). *Position statement: Models of group prenatal care.* Retrieved from http://www.midwife.org/ACNM/files/ACNMLibraryData/UPLOADFILENAME/000000000230/Models-of-Group-Prenatal-Care-PS-Sept2016.pdf

American College of Nurse Midwives (2012). *Core competencies for basic midwifery practice.* Retrieved from http://www.midwife.org/ACNM/files/ACNMLibraryData/UPLOADFILENAME/000000000050/Core%20Comptencies%20Dec%202012.pdf

Bandura, A. (1999). Social cognitive theory: An agentic perspective. *Asian Journal of Social Psychology, 2*(1). Retrieved from http://dx.doi.org/10.1111/1467-839x.00024

Bandura, A. (2004). Health promotion by social cognitive means. *Health Education & Behavior, 31*(2)*,* 143-164. http://dx.doi.org/10.1177/1090198104263660

Brumley, J., Cain, M. A., Stern, M., & Louis, J. M. (2016). Gestational weight gain and breastfeeding outcomes in group prenatal care. *Journal of Midwifery & Women's Health,* 1-6. doi:10.1111/jmwh.12484

Centers for Disease Control and Prevention Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion. (2015). *Preterm birth*. Retrieved from http://www.cdc.gov/reproductivehealth/MaternalInfantHealth/PretermBirth.htm.

Cnattingius, S., Bergstrom, R., Lipworth, L, & Kramer, M. S. (1998). Pre-pregnancy weight and the risk of adverse pregnancy outcomes. *New England Journal of Medicine, 338*(3), 147-152. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/9428815

Donaldson, S. I. (2006). *Applied psychology: New frontiers and rewarding careers.* Hove, United Kingdom: Psychology Press.

Dowswell, T., Guillermo, C., Duley, L., Gates, S., Gulmezoglu, A. M., Khan-Neelofur, D., Piaggio, G. G. P. (2010). Alternative versus standard packages of antenatal care for low-risk pregnancy. *Cochrane Database of Systematic Reviews.* Retrieved from https://doi.org/10.1002/14651858.cd000934.pub2

Fiscella, K. (1995). Does prenatal care improve birth outcomes? A critical review. *Obstetrics & Gynecology, 85*(3), 468-479. Retrieved from https://doi.org/10.1016/0029-7844(94)00408-6

Gareau, S., Lopez-De Fede, A., Loudermilk, B. L., Cummings, T. H., Hardin, J. W., Picklesimer, A. H., Crouch, E., & Covington-Kolb, S. (2016). Group prenatal care results in Medicaid Savings with better outcomes: A propensity score analysis of CenteringPregnancy participation in South Carolina. *Maternal and Child Health Journal, 20*, 1384-1393. doi: 10.1007/s10995-016-1935-y

Grady, M. A., & Bloom, K. C. (2004). Pregnancy outcomes of adolescents enrolled in a CenteringPregnancy program. *Journal of Midwifery and Women's Health, 49*(5), 412-420. doi:10.1016/j.jmwh.2004.05.009

Hale, N., Picklesimer, A. H., Billings, D. L., & Covington-Kolb, S. (2014). The impact of Centering Pregnancy group prenatal care on postpartum family planning. *American Journal of Obstetrics & Gynecology, 210*(50), e1-7. DOI 10.1016/j.ajog.2013.09.001

Hamilton, B. E., Martin, J. A., Osterman, M. J. K., Curtin, S. C., & Matthews, T. J. (2015). Births: Final data for 2014. *National Vital Statistics Reports, 64*(12). 1-63. Retrieved from https://www.cdc.gov/nchs/data/nvsr/nvsr64/nvsr64_12.pdf

Heberlein, E. C., Picklesimer, A. H., Billings, D. L., Covington-Kolb, S., Farber, N., & Frongillo, E.A., (2015). The comparative effects of group prenatal care on psychosocial outcomes. *Archives Women's Mental Health.* doi: 10.1007/s00737-015-0564-6

Ickovics, J. R., Earnshaw, V., Lewis, J. B., Kershaw, T. S., Magriples, U., Stasko, E., Rising, S. S., Cassells, A., Cunningham, S., Bernstein, P., & Tobin, J. N. (2016). Cluster randomized controlled trial of group prenatal care: Perinatal outcomes among adolescents in New York City health centers. *American Journal of Public Health, 106*(2), 359-365. doi:10.2105/AJPH.2015.302960

Ickovics, J. R., Kershaw, T. S., Westdahl, C., Magriples, U., Massey, Z., Reynolds, H., & Rising, S. S. (2007). Group prenatal care and perinatal outcomes: A randomized controlled trial. *Obstetrics and Gynecology, 110*(2), 330-339. DOI: 10.1097/01.AOG.0000275284.24298.3

Ickovics, J. R., Kershaw, T. S., Westdahl, C., Rising, S. S., Klima, C., Reynolds, H., & Magriples, U. (2003). Group prenatal care and preterm birth weight: Results from a matched cohort study at public clinics. *Obstetrics & Gynecology, 102*(5), 1051-1057. DOI: 10.1016/S0029-7844(03)00765-8

Institute of Medicine: Committee to Study the Prevention of Low Birthweight. (1985). *Preventing low birth weight*. Washington D.C.: National Academy Press.

Institute of Medicine: Committee to Study Outreach for Prenatal Care, Division of Health

Promotion and Disease Prevention. (1988). *Prenatal care: Reaching mothers, reaching infants.* Washington D.C.: The National Academy Press.

Institute of Medicine (2009). Weight gain during pregnancy: Re-examining the guidelines. Washington, DC: National Academy of Sciences.

Iyasu, S., Tomashek, K., & Barfield, W. (2002). Infant mortality and low birth weight among black and white infants – United States, 1980-2000. *Morbidity and Mortality Weekly Report, 51*(27), 589-92. Retrieved from https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5127a1.htm

Jafari, F., & Eftekhar, H. (2010). Comparison of maternal and neonatal outcomes of group versus individual prenatal care: A new experience in Iran. *Health Care for Women International, 31*, 571-584. DOI: 10.1080/07399331003646323

Jafari, F., Eftekhar, H., Mohammad, K., & Fotouhi, A. (2010). Does group prenatal care affect satisfaction and prenatal care utilization in Iranian pregnant women? *Iranian Journal of Public Health, 39*(2), 52-62.

Kennedy, H. P., Farrell, T., Paden, R., Hill, S., Jolivet, R. R., Cooper, B. A., & Rising, S. S. (2011). A randomized clinical trial of group prenatal care in two military settings. *Military Medicine, 176*(10), 1169-1177. DOI: 10.7205/milmed-d-10-00394

Klima, C., Norr, K., Vonderheid, S., & Handler, A. (2009). Introduction of CenteringPregnancy in a public health clinic. *Journal of Midwifery & Women's Health, 54*(1), 27-34. DOI:10.1016/j.jmwh.2008.05.008

Konuk Sener, D., Cimete, G. (2016). A program based on social cognitive theory and

Smith's Model of health and illness and its effect on maternal self-efficacy and child behavior. *Children and Youth Services, 64*, 82-90. Retrieved from http://dx.doi.org/10.1016/j.childyouth.2016.03.007

Kotelchuck, M. (1994). *Overview of adequacy of prenatal care utilization index.* Retrieved from http://ipodr.org/Overview_APCUIndex.pdf

Krans, E. E., & Davis, M. M. (2014). Strong start for mothers and newborns: Implications for prenatal care delivery. *Current Opinion Obstetrics & Gynecology, 26*(6), 511-515. Retrieved from http://europepmc.org/articles/pmc4247992

Magriples, U., Boynton, M., Kershaw, T. S., Lewis, J., Schindler Rising, S., Tobin, J. N., Epel, E., & Ickovics, J. R. (2015). The impact of group prenatal care on pregnancy and postpartum weight trajectories. *American Journal of Obstetrics and Gynecology, 213*(688), e1-9. DOI: 10.1016/ajog.2015.06.066

March of Dimes (2014) *Low birthweight.* Retrieved from http://www.marchofdimes.org/complications/low-birthweight.aspx

Massey, Z., Rising, S. S., & Ickovics, J. (2006). CenteringPregnancy group prenatal care: Promoting relationship-centered care. *Journal of Obstetric, Gynecologic & Neonatal Nursing, 35*(2), 286-294. Retrieved from https://doi.org/10.1111/j.1552-6909.2006.00040.x

Mazzoni, S. E., Hill, P. K., Webster, K. W., Heinrichs, G. A., & Hoffman, M. C. (2015). Group prenatal care for women with gestational diabetes. *Journal of Maternal-Fetal & Neonatal Medicine.* DOI: 10.3109/1476058.2015.1107541

McNeil, D. A., Vekved, M., Dolan, S. M., Siever, J., Horn, S., & Tough, S. C. (2013). A

qualitative study of the experience of CenteringPregnancy group prenatal care for physicians. *BMC Pregnancy & Childbirth, 13*(1). DOI: 10.1186/1471-2393-13-S1-S6

Novick, G. (2004). CenteringPregnancy and the current state of prenatal care. *Journal of Midwifery & Women's Health, 49,* 405-411. DOI:10.1016/j.jmwh.2004.06.001

Petrou, S., Sach, T., & Davidson, L. (2001). The long-term costs of preterm birth and low birth weight: Results of a systematic review. *Child Care Health Development, 27*(2), 97-115. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/11251610

Picklesimer, A. H., Billings, D., Hale, N., Blackhurst, D., & Covington-Kolb, S. (2012). The effect of CenteringPregnancy group prenatal care on preterm birth in a low-income population. *American Journal of Obstetrics and Gynecology, 206*(5), 415.e1-415.e7. DOI: 10.1016/j.ajog.2012.01.040

Robertson, B., Aycock, D. M., & Darnell, L. A. (2009). Comparison of centering pregnancy to traditional care in Hispanic mothers. *Maternal & Child Health Journal, 13,* 407-414. DOI:10.1007/s10995-008-0353-1

Schellinger, M. M., Abernathy, M. P., Amerman, B., May, C. Foxlow, L. A., Carter, A. L., Barbour, K., Luebbehusen, E., Ayo, K., Bastawros, D., Rose, R. S., & Haas, D. M. (2016). Improved outcomes for Hispanic women with gestational diabetes using the CenteringPregnancy group prenatal care model, *Maternal & Child Health Journal.* DOI: 10.1007/s10995-016-2114-x

Shakespear, K., Waite, P. J., Gast, J. (2009). A comparison of health behaviors of women in Centering Pregnancy and traditional prenatal care. *Maternal & Child Health Journal, 14*, 202-208. DOI: 10.1007/s10995-009-0448-3

Smith, C. (2016). Centering contraception: Postpartum contraception choices of women

enrolled in group versus traditional prenatal care. *Contraception Journal, 94*(4). Retrieved from http://dx.doi.org/10.1016/j.contraception.2016.07.082

Tandon, S. D., Cluxton-Keller, F., Colon, L., Vega, P., & Alonso, A. (2013). Improved adequacy of prenatal care and healthcare utilization among low-income Latinas receiving group prenatal care. *Journal of Women's Health, 22*(12), 1056-1061. DOI: 10.1089/jwh.2013.4352

Tandon, S. D., Colon, L., Vega, P., Murphy, J., & Alonso, A. (2012). Birth outcomes associated with receipt of group prenatal care among low-income Hispanic women. *Journal of Midwifery & Women's Health, 57*(5), 476-481. DOI:10.1111/j.1542-2011.2012.00184.x

Tanner-Smith, E. E., Steinka-Fry, K. T., & Gesell, S. B. (2014). Comparative effectiveness of group and individual prenatal care on gestational weight gain. *Maternal & Child Health Journal, 18*, 1711-1720. doi: 10.1007/s10995-013-1413-8

Tanner-Smith, E. E., Steinka-Fry, K. T., & Lipsey, M. W. (2014). The effects of CenteringPregnancy group prenatal care on gestational age, birth weight, and fetal demise. *Maternal & Child Health Journal, 18,* 801-809. DOI: 10.1007/s10995-013-1304-z

Tilden, E. L., Hersh, S. R., Emeis, C. L., & Weinstein, S. R. (2014). Group prenatal care: Review of outcomes and recommendations for model implementation. *Obstetrical & Gynecologic Survey, 69*(1), 46-55. DOI: 10.1097/OGX.0000000000000025

Trotman, G., Chhatre, G., Darolia, R., Tefera, E., Damle, L., & Gomez-Lobo, V. (2015).

The effect of Centering Pregnancy versus traditional prenatal care models on improved adolescent health behaviors in the perinatal period. *Journal of Pediatric & Adolescent Gynecology, 28*(5), 395-401. DOI 10.1007/s10995-009-0448-3

Trudnak, T. E., Arboleda, E., Kirby, R. S., & Perrin, K. (2013). Outcomes of Latina women in CenteringPregnancy group prenatal care compared with individual prenatal care. *Journal of Midwifery & Women's Health, 58,* 396-403. DOI 10.1111/jmwh.12000

Appendix: The Literature Matrix

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Brumley, J., Cain, M. A., Stern, M., & Louis, J. M. (2016). Gestational weight gain and breastfeeding outcomes in group prenatal care. *Journal of Midwifery & Women's Health.* 1-6. doi:10.1111/jmwh.12484	Compare differences in women who participate in traditional and group prenatal care with regard specifically to maternal weight gain.	Matched case cohort study with 130 women in traditional care and 65 who chose group. Women must have low-risk pregnancies.	Retrospective cohort study	Total maternal weight gain, gestational weight gain in reference to BMI category, newborn birth weight, mode of birth, and breastfeeding at the 6 weeks postpartum examination.	No significant difference in maternal gestational weight gain, newborn birth weight, gestational age at birth, and mode of birth.	Increased randomized controlled trials. This had a very small sample size which made it hard to determine differences between groups. Need for increased studies with randomization.	Level III Low quality

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Gareau, S., Lopez-De Fede, A., Loudermilk, B. L., Cummings, T. H., Hardin, J. W., Picklesimer, A. H., Crouch, E., & Covington-Kolb, S. (2016). Group prenatal care results in Medicaid Savings with better outcomes: A propensity score analysis of CenteringPregnancy participation in South Carolina. *Maternal and Child Health Journal, 20*. 1384-1393. doi: 10.1007/s10995-016-1935-y	Understand the cost savings of prevention of adverse birth outcomes for Medicaid women participating in group prenatal care. The study examined low birth weight and NICU visits.	1262 women in CenteringPregnancy group prenatal care (CP) and 5066 women in individual care (IC). All women were on Medicaid and had low-risk pregnancies. Women were all nulliparous.	Retrospective five year cohort study	Paid medical claims data was analyzed to measure inpatient medical costs associated with birth outcomes from IC and CP.	- CP reduced the risk of premature infant birth by 36% ($p<0.05$) compared to IC. - CP risk of having a low birth weight baby was reduced by 44% ($p<0.05$). -CP risk of having a NICU stay was reduced by 28% compared to IC ($p<0.05$). - 22 mothers need to be treated with CP to avoid a low birth weight baby and 25 to void a premature birth. One NICU visit was prevented by 30 mothers in CP.	CP reduces preterm, low birth weight babies and NICU visits. This results in cost-savings. Samples were not randomized. There were more IC women who were Latina as well as who were adolescents or over the age of 35. Also, it would be helpful to examine demographic characteristics and risky behaviors that were not accessible through Medicaid claims data.	Level III Good quality

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Grady, M. A., & Bloom, K. C. (2004). Pregnancy outcomes of adolescents enrolled in a CenteringPregnancy program. *Journal of Midwifery and Women's Health, 49*(5). 412-420. doi:10.1016/j.jmwh.2004.05.009	Evaluate outcomes of CP with pregnant adolescents.	124 adolescents from the Teen Pregnancy Center, an urban hospital-based clinic in St. Louis Comparison group 1: 144 adolescents <17 years who gave birth at the Barnes Jewish Hospital in 2001 excluding those with no prenatal care. Comparison group 2: 233 adolescents <17 y/o who gave birth at Barnes Jewish Hospital in 1998, including those with no prenatal care	Retrospective comparison study.	Attendants rates, perinatal outcomes: low birth weight (<2500g), preterm delivery (<37 weeks), cesarean birth rate, breastfeeding rate, pediatric provider, level of satisfaction measured twice in program by Sharon Rising's CP workbook client satisfaction evaluation. Demographics of race; all were predominantly African American; statistically significant difference in African Americans in CP group and Comparison group 2.	CP group: Consistent prenatal care; mean visits 11.5. Lower no-show rate 19% vs. 28%) 87% returned for a PP visit within 8 weeks 10.5% preterm delivery rate vs 25.7% in Group 1 8.9% LBW vs 22.9% in Group 1 13.7% cesarean rate comparable to comparison groups 46% breastfeeding at hospital vs. 28% (P<.02) 79% had a pediatrician CP group was satisfied with care	Randomized control trial would be less biased: girls who chose CP may be more motivated from the beginning.	Level III Low Quality

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Hale, N., Picklesimer, A. H., Billings, D. L., & Covington-Kolb, S. (2014). The impact of Centering Pregnancy group prenatal care on postpartum family planning. *American Journal of Obstetrics & Gynecology, 210*(50). e1-7. DOI 10.1016/j.ajog.2013.09.001	Determine the effects of group prenatal care (GPC) on postpartum family planning.	3637 women who gave birth between 2009 and 2012 and were enrolled in Medicaid were selected. 570 women had obtained GPC and 3067 individual prenatal care (IPC). Women must have started prenatal care within their first 16 weeks gestation with low-risk pregnancies. Propensity scoring used to match samples.	Retrospective cohort study	Visit data was collected through Medicaid billing codes. Adequacy of Prenatal care Utilization Index (APCNU)	Adequacy of prenatal care was higher for GPC ($p<0.05$) Smoking during pregnancy was lower among GPC 19.65% vs. 25.2% ($p<0.05$) Only 2.11% of women in GPC developed GDM as opposed to IPC 6.59% ($p<0.05$). Postpartum family planning was higher among GPC women at 3, 6, 9 and 12 months postpartum. At 3 months 7.72% in GPC vs 5.15% At 6 months postpartum 22.98% of GPC used family planning compared to 15.10% At 9 months 27.2% of GPC used family planning compared to 18.42% At 12 months postpartum 29.30% GPC compared to 20.38% of ICP used family planning services.	Women in group prenatal care are more likely to use family planning services post partum. Large sample size with diverse population. Randomized controlled trials would be more reliable.	Level III Good quality

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Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Ickovics, J. R., Earnshaw, V., Lewis, J. B., Kershaw, T. S., Magriples, U., Stasko, E., Rising, S. S., Cassells, A., Cunningham, S., Bernstein, P., & Tobin, J. N. (2016). Cluster randomized controlled trial of group prenatal care: Perinatal outcomes among adolescents in New York City health centers. *American Journal of Public Health, 106*(2). 359-365. doi:10.2105/AJPH.2015.302960	To determine if pregnant women assigned to group prenatal care (GPC) would have improved outcomes for gestational age at delivery, infant birth weight, STI occurrence, rapid repeat pregnancies, admission and days in NICU and decreased behavioral risk assessments.	Obtained sample from 4 community health centers and 10 hospitals in New York City that serve low-resource women. The sample consisted of adolescents aged 14-21 with low-risk pregnancies <24 weeks gestation, who could speak English or Spanish. 573 women in the intervention group (Centering Pregnancy/CP) 575 women in control group (individual prenatal care/IPC).	Randomized controlled study	Structured interviews at four points during the study and maternal and child medical records.	- GPC were less likely to have a small for gestational age babies than individual care (11% vs 15.8%, p=0..04) and when they did, the child was born at a later gestational age. - Less small for gestational age (SGA) infants were preterm in GPC (8.3% vs. 13.6. - No differences in other outcomes in intention-to-treat analysis. No differences in total number of prenatal visits. - Correlation between the number of GPC visits women attended and the likelihood of delivering an SGA baby. - Attending more groups was associated with having less days in NICU (p<.001), lower likelihood of a rapid repeat pregnancy (p=.02), fewer acts of unprotected intercourse (p<.01).	Group prenatal care may improve outcomes for neonatal weight and decrease the incidence of small for gestational age newborns. A larger sample would help determine reliability of results.	Level I Good quality; including a broader spectrum of ages would make the results more generalizable.

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Ickovics, J. R., Kershaw, T. S., Westdahl, C., Magriples, U., Massey, Z., Reynolds, H., & Rising, S. S. (2007). Group prenatal care and perinatal outcomes: A randomized controlled trial. *Obstetrics and Gynecology, 110*(2). 330-339. DOI: 10.1097/01.AOG.0000275284.24298.3	Establish whether group prenatal care improves pregnancy outcomes, psychological function, and patient satisfaction, and to examine potential cost differences with individual prenatal care.	1,047 pregnant women aged 14-25. Women with medical conditions requiring individual care were excluded from randomization.	Multisite randomized control trial	Five-minute APGAR scores, birth weight, and gestational age. Psychosocial outcomes measured with: Pregnancy Distress Questionnaire, Patient Participation and Satisfaction Questionnaire Race, age, income, education all measured. Birth costs established from billing at hospitals Adequacy of Prenatal care measured by the Kotelchuck Index	Intent-to-treat analysis: women in group care were less likely to have preterm births. Women in groups had higher prenatal knowledge, expressed feeling more ready for labor and were more satisfied with care. Breastfeeding initiation was higher in group PC. No differences in birth weight nor in costs associated with PC.	Group PC had equal or improved perinatal outcomes at no additional cost. Future research in understanding the behavioral, social and biological mechanisms effecting results of PC. Further assessment with larger samples.	Level I High quality

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Ickovics, J. R., Kershaw, T. S., Westdahl, C., Rising, S. S., Klima, C., Reynolds, H., & Magriples, U. (2003). Group prenatal care and preterm birth weight: Results from a matched cohort study at public clinics. *Obstetrics & Gynecology, 102*(5). 1051-1057. DOI: 10.1016/S0029-7844(03)00765-8	Compare birth weight and gestational age in group versus individual prenatal care.	458 (229 in group and 229 in individual) pregnant women < 24 weeks gestation in one of three clinics in Atlanta, GA or New Haven, CT. Women were matched by clinic, age, race, parity and infant birth date by random selection of comparison group patients. Patients with severe psychological or medical problems were excluded. Women were predominantly black and Hispanic of low socioeconomic status.	Prospecti ve matched cohort study	Birth weight (g) Gestational age (by LMP with u/s confirmation) Preterm (<37 weeks) Low birth weight (<2500g) VLBW (<1500g) Patient demographics: age, race, parity and obstetric history, number of prenatal visits.	Group prenatal care had greater birth weights (P<.01) No difference in preterm delivery. Preterm infants of group PC had greater birth weights than individual care by 407.9g (P<.05) 16 infants in group care that were LBW and 23 in individual 3 infants in group who were VLBW vs. 6 in individual. 2 infants born <33 weeks in group vs. 7 in individual. 0 experienced neonatal loss in group vs. 3 in individual. Group patients maintained pregnancies about 2 weeks longer than individual care (P<.001).	Need for further studies with randomized samples, however the matched design limited bias for some of the demographic predictors.	Level III High Quality

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Jafari, F., & Eftekhar, H. (2010). Comparison of maternal and neonatal outcomes of group versus individual prenatal care: A new experience in Iran. *Health Care for Women International, 31*. 571-584. DOI: 10.1080/07399331003646323	Compare maternal and neonatal outcomes of Iranian women receiving group prenatal care with women receiving individual prenatal care.	Inclusion criteria: pregnancy at < 24 wks gestation, willing to participate, no severe medical problems. Health center randomly selected sample. 344 women in intervention group: Group prenatal care 334 women in control group: individual prenatal care No differences in age, parity, literacy, gestational age at booking or BMI and reproductive history.	Cluster randomized control trial, prospective	Low birth weight, (<2500g) preterm birth (<37 weeks), gestational age at delivery, intrauterine growth restriction (<10th percentile), birth weight and perinatal death (fetal demise >20 weeks gestation or neonatal death)	After cluster adjusted differences in means clustering nulliparity and history of IUGR there was significantly less IUGR in intervention. Birth weight p <.011 Birth weight was higher in group PC than in individual care. There were no significant primary outcomes before cluster differences due to small sample size. Intervention group more likely to take vitamins, return to contraceptive method by two months postpartum and began breastfeeding faster after birth than control group.	More studies are needed with individually randomized trials and larger sample size. Also studies need to be done that include women with medical problems as these women may benefit more from group prenatal care.	Level I Good quality

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Jafari, F., Eftekhar, H., Mohammad, K., & Fotouhi, A. (2010). Does group prenatal care affect satisfaction and prenatal care utilization in Iranian pregnant women? *Iranian Journal of Public Health, 39*(2). 52-62.	To determine the difference of prenatal care satisfaction and use among women in individual (IPC) versus group prenatal care (GPC).	678 women who attend clinics in Zanjan, Iran, where many women do not have adequate care. The clinic is a public clinic and the services are free and provide free supplies and supplements to women. Women were less than 24 weeks gestation with low-risk pregnancies. 320 women in intervention and 308 in individual care	Cluster-randomized controlled trial.	- Standardized, closed-ended questionnaires - Kotelchuck's Adequacy of Prenatal Care Utilization Index	- GPC were very satisfied with care and IPC were somewhat satisfied ($p<0.000$). - Only 37.3% of women in IPC received adequate care coming to the specified number of prenatals whereas group had 70.3%. - Women in group care were more satisfied with education they received, feeling like the provider listened to their problems and answered their questions, as well as the time spent during care, ease of appointment making, and waiting time. Group care participants felt the quality of care was better.	Women in Iran are more likely to attend and be satisfied with group prenatal care than with individual prenatal care. Women were asked questions about satisfaction and may have not answered truthfully because they were reluctant to criticize their providers.	Level I Good quality

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Kennedy, H. P., Farrell, T., Paden, R., Hill, S., Jolivet, R. R., Cooper, B. A., & Rising, S. S. (2011). A randomized clinical trial of group prenatal care in two military settings. *Military Medicine, 176*(10). 1169-1177. DOI 10.7205/milmed-d-10-00394	Compare the effects of group prenatal care (GPC) with individual prenatal care (IPC) on the outcomes of family health care readiness.	Drawn from prenatal care clinics at a U.S. Naval hospital using 322 women. Participants needed to be pregnant with a gestational age <16 weeks, at least 18 years old without a high-risk pregnancy and English speaking.	Longitudinal three-year randomized clinical trial	- Kotlechuck - Index of Prenatal Care Adequacy- measured numbers of prenatal visits - Prenatal Health Behavior Scale (PHBS)- engagement in healthy behaviors - Chart abstraction during postpartum - Norbeck Social Support Scale - Patient Participation and Satisfaction Questionnaire - Perceived Stress Scale - Revised Prenatal Distress Questionnaire - CES-D depression report - PDSS Postpartum depression screen	Prenatal Care Adequacy: - IPC: mean number of visits: 8.56, 46.7% had <9 visits. -GPC: mean number of visits 10.31, 12.9% had <9 visits. P<0.0005 with women in GPC 6 times more likely to receive adequate PNC Satisfaction with PNC: GPC more likely to be satisfied p<0.001 and felt more able to participate (p<0.001) No differences for perinatal outcomes or missed days of work, perceived stress, or perceived social support. No differences in prenatal or postnatal depression. PDSS**:** GPC were significantly less likely to report feelings of shame or guilt.	Women in group prenatal care are more likely to obtain adequate prenatal care and may experience less shame and guilt in the postpartum period. This study could be limited because providers for GPC also provided care for IPC.	Level I Good quality

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Klima, C., Norr, K., Vonderheid, S., & Handler, A. (2009). Introduction of CenteringPregnancy in a public health clinic. *of Midwifery & Women's Health, 54*(1). 27-34. doi:10.1016/j.jmwh.2008.05.008	Compare feasibility, satisfaction and patient outcomes between group prenatal and individual prenatal care among low-income African American women	Public health clinic serving primarily low-income African American women. All clients eligible for Medicaid, low-risk pregnancies <18 weeks gestation at time of CP group. 67 women in CP group Compared to 207 women who gave birth at the university hospital during the study period and had individual prenatal care Participants were African American between 14-38 y/o.	Descriptive comparative study	Qualitative focus groups were evaluated for accessibility and feasibility of the program. Client satisfaction scale used by Handler et al. was done for CP and individual care. No demographic data obtained. Medical record review for maternal age, birth weight, gestational age and breastfeeding at discharge. Prenatal visits and weight gain obtained from clinic record.	Mean age of women in CP was significantly lower than individual care 20.8 vs 22.1 (P<.05) CNMs and staff expressed concern about feasibility of CP. Women enjoyed experience, felt "well prepared" and liked sharing experiences. Four themes in CP: 1) Increased education and support 2) Women were happier and seemed to want to come to CP 3) Institutional barriers 4) Difficult to learn group facilitation skills. Women in group care had higher satisfaction (P<.05) No statistical difference in birth outcomes. CP attended more prenatal visits (9.7 vs 8.3). CP women gained more weight (32.2 lbs vs 28.5 lbs) CP were more likely to breastfeed in hospital (59% vs 44% P=.05)	Lack of randomized control groups, may be bias as women self-selected the group care model. Continue studies with larger sample size across different clinics the generalize results.	Level III Low Quality

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Magriples, U., Boynton, M., Kershaw, T. S., Lewis, J., Schindler Rising, S., Tobin, J. N., Epel, E., & Ickovics, J. R. (2015). The impact of group prenatal care on pregnancy and postpartum weight trajectories. *American Journal of Obstetrics and Gynecology, 213*(688). e1-9. DOI: 10.1016/ajog.2015.06.066	Determine the impact of Centering Pregnancy Plus (CP+) on pregnancy weight gain and postpartum weight loss and the effects of prenatal depression on weight.	1233 pregnant adolescents aged 14-21 years old selected from clinics serving low-income and minority women. Women must have pregnancy before 24 weeks gestation with low-risk pregnancies	Secondary analysis of a cluster randomized trial of CP +	Medical record review and 4 structured interviews. - BMI - Weight during pregnancy measured from medical record review -Gestational age measured with ultrasound - 15 Item Centers for Epidemiologic Study-Depression - Prenatal Distress Questionnaire - Nutrition assessed with REAP - Physical activity with WAVE	- No difference in the number of prenatal visits - CP gained less weight during pregnancy and retained less weight 12 months postpartum, mean 12 month postpartum weight gain was within guidelines of <10 pounds. - Women in individual care who had high baseline depressive symptoms had more weight gain in pregnancy and less weight loss after delivery ($p<.0001$). Retained 22 lbs postpartum as opposed to those with high depression in CP 13.5lbs.	Women with higher levels of stress may benefit the most from group prenatal care when it comes to healthy weight gain in pregnancy and loss postpartum. Sample is predominantly adolescent and ethnic minorities; results may not be generalizable to adults over the age of 21 of other ethnicities.	Level I High Quality

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Mazzoni, S. E., Hill, P. K., Webster, K. W., Heinrichs, G. A., & Hoffman, M. C. (2015). Group prenatal care for women with gestational diabetes. *Journal of Maternal-Fetal & Neonatal Medicine.* DOI: 10.3109/1476058.2015.1107541	To examine if group prenatal care impacts the progression to A2 gestational diabetes mellitus.	Women diagnosed with GDM who attended group prenatal care compared to a group of women diagnosed in individual care. Women must have attended at least two prenatal care visits. 62 women were in group care and 103 in individual care. Most women in care were Hispanic, obese, and uninsured or on Medicaid.	Prospective observational cohort	Medical chart review	- Group care progressed to A2 GDM less frequently 40% vs. 84% in individual care ($p<0.001$). - Oral meds were prescribed similarly, insulin was required less in group care 26% vs. 63% ($p<0.001$). - No difference in gestational age or preterm birth in groups - Women in group care were more likely to attend a postpartum visit (92% vs. 66%, $p<0.002$) and be tested postpartum for overt diabetes (76% vs. 48%, $p<0.001$).	Women with GDM in pregnancy have reduced incidence of progressing to insulin dependent diabetes in pregnancy and also are more likely to be tested for overt diabetes postpartum. There is selection bias as the sample was not randomized. The population was also largely Hispanic which may limit generalizability. Sample size was also small.	Level III Low quality

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Picklesimer, A. H., Billings, D., Hale, N., Blackhurst, D. & Covington-Kolb, S. (2012). The effect of CenteringPregnancy group prenatal care on preterm birth in a low-income population. *American Journal of Obstetrics and Gynecology, 206*(5). 415.e1-415.e7. DOI: 10.1016/j.ajog.2012.01.040	Evaluate the impact of group prenatal care (PC) on preterm birth.	316 women in group PC compared to 3767 women in traditional care. All women in low-risk pregnancies in the Greenville hospital system. Greenville Hospital reaches medically underserved women primarily on Medicaid. Women self-selected participation in group PC. Participation was included even if women only attended one appointment.	Retrospective, descriptive, comparative cohort study.	Hospital database gave gestational age, and weight. Bivariate group comparisons between women who received group PC and control were made. Multiple logistic regression analysis was obtained to adjust odds ration. Adequacy of prenatal care measure with the Kotelchuck Index Maternal demographics: age, race, parity, gestational age starting PC. Risk factors for preterm birth: STIs, tobacco use and history of preterm birth were similar between groups.	Preterm birth <37 weeks gestation was lower (7.9%) in group care vs. 12.7% with traditional care (P=.01) as well as delivery at <32 weeks gestation, 1.3% (group care) vs 3.1% traditional care (P=.01) Participation in group care improves the rate of preterm birth compared with traditional care especially among black women.	Randomized studies are needed to eliminate bias.	Level III Good quality

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Robertson, B., Aycock, D. M., & Darnell, L. A. (2009). Comparison of centering pregnancy to traditional care in hispanic mothers. *Maternal & Child Health Journal, 13*. 407-414. DOI:10.1007/s10995-008-0353-1	Compare outcomes of Hispanic women participating in CP to those receiving traditional prenatal care.	24 Women in CP group, 25 in traditional group. Self-selected their group at a hospital based clinic. All Hispanic women self-paying on a sliding scale or on Medicaid. Inclusion criteria >18 y/o and able to speak and read English, have at least 4 prenatal visits.	Non-equivalent, pre-post test comparative design.	Questionnaires at initial visit, 34-36 weeks and at PP. Demographics data form, Pregnancy History Scale, Rosenberg Self-Esteem Scale, Prenatal/Postnatal Care Knowledge and Pregnancy Relevant Health Behaviors. Breastfeeding Behavior Scale, Center for Epidemiologic Studies Depression Scale, Satisfaction Questionnaire and Centering Questionnaire.	No significant differences in socio-demographic characteristics. No significant differences in gestational age and birth weight, breastfeeding experiences or health behaviors. Mothers in the traditional group had higher self-esteem scores than CP group. Postnatal outcomes, depression and satisfaction were all similar. Both groups were satisfied with their care. Those in the CP group said their experience was positive and 87% would choose that group again.	Replicate the study in a larger, heterogeneous population. There were quite a few women who dropped out due to lack of follow-up. Identify barriers to follow up care. Separate countries of origin in future studies.	Level III Low quality

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Schellinger, M. M., Abernathy, M. P., Amerman, B., May, C. Foxlow, L. A., Carter, A. L., Barbour, K., Luebbehusen, E., Ayo, K., Bastawros, D., Rose, R. S., & Haas, D. M. (2016). Improved outcomes for Hispanic women with gestational diabetes using the Centering Pregnancy GroupPrenatal care model, *Maternal & Child Health Journal.* DOI 10.1007/s10995-016-2114-x	To compare glycemic control during the antenatal and postpartum periods for women in group prenatal care and traditional prenatal care.	203 women in Centering Pregnancy (CP) and 257 women in traditional care (TC) diagnosed with gestational diabetes mellitus (GDM). Women in CP must have Spanish as their preferred language.	Retrospective cohort study	Postpartum glucose tolerance testing, postpartum visit attendance, birth outcomes, breastfeeding, and initiation of a family planning method. Data found from electronic medical records.	- There was a significant difference in race with 100 % in CP being Hispanic compared to only 46.9 % of the TC group. ($p< 0.001$). - Women in CP were more likely to complete postpartum glucose tolerance testing (83.6 %) than TC (60.7 %) ($p< 0.001$) - Not a large difference in postpartum visit attendance (94.9 in CP vs. 87.3 % in TC, $p = 0.008$). - During pregnancy, less women in CP required drug therapy than those in TC ($p = 0.009$). - Women in CP were more compliant with antenatal appointments (appointment no-show rate of 6.7 vs. 13.9 % for traditional care, $p = 0.01$). - No significant difference in delivery outcomes of gestational age, PTL, cesarean delivery or neonatal outcomes. - Rates of NICU admissions were the same, admissions for neonatal hypoglycemia was higher in the CP group. When only Hispanic women with GDM were	This study was not generalizable as the entire sample in the CP group was Hispanic. While analyzing the results, the researchers took that into account and looked at the results both using the entire traditional group as well as comparing the CP group to just Hispanic women in the traditional group. However, when comparing only Hispanic women the sample size is too small for conclusions. Authors did describe, however, that with CenteringPregnancy Hispanic women have a higher likelihood of obtaining postpartum screening for diabetes and are less likely to need pharmacologic management for GDM in pregnancy.	Level III Low Quality

					compared, no difference in the rate of neonatal hypoglycemia was seen.		

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Shakespear, K., Waite, P. J., Gast, J. (2009). A comparison of health behaviors of women in Centering Pregnancy and traditional prenatal care. *Maternal & Child Health Journal, 14*. 202-208. doi: 10.1007/s10995-009-0448-3	Explore the difference in health behaviors between women in Centering Pregnancy (CP) and traditional prenatal care (TPC).	Convenience sample of 125 pregnant women who had either enrolled in CP or traditional care. Women were recruited from an urban clinic where the majority of patients were on Medicaid. Women were 18 or older and between 28-42 weeks gestation. 50 women in CP participated in the survey and 75 from TPC.	Correlational, cross-sectional, two-design	Paper and pencil surveys Lindgren's Health Practices Questionnaire-II (HPQ-II)	TPC women reported their concerns to a provider more often, avoided exposure to dangerous substances, discussed pregnancy with others, discussed medication and supplements with physician, consumed adequate amounts of fiber, avoided un-recommended herbs, avoided excessively hot baths, asked more questions of their care provider, engaged in relaxing activities, and avoided risky sexual practices than those in CP group. CP group attended more prenatal appointments and birth classes. No difference in the amount of health behaviors changed during pregnancy Traditional prenatal care valued their prenatal care more.	There were no differences in groups' behavior change in pregnancy. A longitudinal design would be helpful to detect differences in behavior change over time.	Level III Low quality; small sample size and not very conclusive results.

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Smith, C. (2016). Centering contraception: Postpartum contraception choices of women enrolled in group versus traditional prenatal care. *Contraception Journal, 94*(4). DOI: http://dx.doi.org/10.1016/j.contraception.2016.07.082	Compare postpartum contraception choices for women in group versus individual prenatal care.	Sample obtained from a hospital in Newark, DE. 289 women in group prenatal care and 587 in the matched participant control groups.	Matched-case control study	Chart reviews from a hospital database were used to find contraceptive methods used postpartum. Proportion of women using each type of contraception was noted in each group.	Group prenatal care participants were more likely to use contraception (p=.047). Group prenatal participants were more likely to use LARC contraception (p=.014).	Group prenatal care has increased use of postpartum contraception, especially LARC methods. Recommend randomized controlled trials with larger sample sizes.	Level III, Good quality.

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Tandon, S. D., Cluxton-Keller, F., Colon, L., Vega, P., & Alonso, A. (2013). Improved adequacy of prenatal care and healthcare utilization among low-income Latinas receiving group prenatal care. *Journal of Women's Health, 22*(12). 1056-1061. DOI: 10.1089/jwh.2013.4352	Discover satisfaction with and engagement of Latinas in prenatal care as well as determine the impact of Centering Pregnancy (CP) on compliance with maternal postpartum checkups, establishing a primary care provider for the newborn and child emergency room visits.	294 women of Hispanic or Mayan origin from two Palm Beach County health clinics. Participants required to be pregnant and <20 weeks gestation. 198 women in CP 92 women in traditional care	Quasi-Experimental	Perceptions of prenatal care-Patient Participation and Satisfaction Questionnaire (PPSQ) Quantity of prenatal care received – expected prenatal care visit ratio Adequacy of Prenatal Care Index Establishment of Medical Home – question Compliance with a maternal postpartum checkup-question Child Emergency Room visits - question	- CP women were more satisfied with prenatal care 84.3 vs. 64.9 (p<.001) - CP were more active participants 39.7 vs. 28.1 (p<.001) - More satisfaction with time spent talking with provider in CP 98% vs. 19% (p<.001) - More in CP were satisfied with ability to speak to their provider in their own language 99% vs. 6% (p<.001) - CP had a greater expected prenatal care visit ratio 101.9 vs. 83.1 (p<.001) - CP women were more likely to have an established medical provider for their child 3 months after delivery 77% vs. 53% (p<.01) - CP women were more likely to attend a postpartum check up 6 wks after deliver 99% vs. 94% (p=.04) - No significant difference in Emergency Department visits between the two groups	CenteringPregnancy group prenatal care improves engagement and satisfaction in prenatal care for the Latina population. It also improved likelihood of a postpartum visit with a provider and establishing a medical provider for the newborn. Small sample size. Women were able to self-select groups, women in CP group may have been more motivated to have healthy behaviors in pregnancy. Measures were not the most reliable.	Level II Low quality; needs larger sample size and more reliable measures.

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Tandon, S. D., Colon, L., Vega, P., Murphy, J., & Alonso, A. (2012). Birth outcomes associated with receipt of group prenatal care among low-income Hispanic women. *Journal of Midwifery & Women's Health, 57*(5). 476-481. doi:10.1111/j.1542-2011.2012.00184.x	Examine the effects of CenteringPregnancy on preterm birth and low-birth-weight rates for Hispanic women.	Hispanic women less than or equal to 20 weeks gestation at 2 Palm Beach County, FL public health clinics. 150 women chose to be in group PC 66 women chose individual PC. Mean ages of 27.4 years old.	Descriptive, comparative	Preterm birth (<37 weeks gestation) Low birth weight (<2500g) Measured by use of t tests. Chi-square analysis assessed the differences in the percentage of low-birth weight neonates and premature births. Demographic data on age, race, main language, length of time in U.S. marital status, parity, employment status, education, level and number of weeks pregnant was obtained through interviews.	Gestational age: 5% of group PC were preterm, 13% of individual PC preterm Birth weight: 3 group PC gave birth to neonates between 1500-1900g, no neonates born in that range for traditional care. No statistically significant differences in birth weight. Demographic data showed that women across all ages can benefit from group PC	Further research to replicate finding of decreased preterm births with group PC using randomized control trials with larger sample size. Implement cost-effective analysis into future designs to determine economic sustainability and basis for group PC. Group PC is a good model for PC even among women with few risk factors.	Level III Good quality

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Tanner-Smith, E. E., Steinka-Fry, K. T., & Gesell, S. B. (2014). Comparative effectiveness of group and individual prenatal care on gestational weight gain. *Maternal & Child Health Journal, 18*. 1711-1720. doi: 10.1007/s10995-013-1413-8	Compare gestational weight gain for women in CenteringPregnancy (CP) versus individual prenatal care (IPC).	393 women who spoke English and had low-risk pregnancies using propensity scores to match women in either individual prenatal care or CenteringPregnancy group care. Urban clinic with primarily African American population. 73% African American 13% Latina 11% White	Retrospective chart review	Height and weight at first and last prenatal visits. Medical chart extraction	CP women were less likely to have excessive gestational weight gain (p=.04) and difference was greater for those who came into pregnancy obese. No difference in low weight gain between groups. CP reduced risk of excessive weight gain to 54% of IPC. Post hoc analysis showed no adverse effects of low gestational weight gain on newborn birth weight, although CP had lower birth weight infants (p=.004) but still within healthy ranges.	Group prenatal care is a possible intervention to decrease excessive weight gain in pregnancy. Further research warranted with RCT and larger sample size.	Level III Good quality; few limitations to the study: retrospective chart review, small sample size, weight gain was taken at last prenatal appointment and not at delivery. Majority of the sample was African American; may not be as generalizable.

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Tanner-Smith, E. E., Steinka-Fry, K. T., & Lipsey, M. W. (2014). The effects of CenteringPregnancy group prenatal care on gestational age, birth weight, and fetal demise. *Maternal & Child Health Journal, 18.* 801-809. doi: 10.1007/s10995-013-1304-z	Compare outcomes of CenteringPregnancy prenatal care (CP) and individual prenatal care on gestational age, birth weight, and fetal demise.	Retrospective chart reviews from five different prenatal sites. Propensity scores used to match women in both groups. 651 women in CP and 5,504 in individual care Excluded from the study were those with high-risk medical conditions	Retrospective descriptive comparative design	Chart Reviews: Preterm birth: with a binary variable, gestational age at birth was less than 7 weeks (1=yes, or 0=no). Low birth weight: variable indicating whether birth was less than 2500 g (1=yes, 0=no). Very low birth weight: was less than 1500 g (1=yes, 0=no) Fetal demise: binary variable (1=yes, 0=no). Data was analyzed using weighted ordinary least squares and weighted logistic regression models.	CP group: additional 1/3 week gestation and extra 29 g in birth weight than individual care Impact of CP for preterm infants: CP group in preterm infants, CP group had 2.56 weeks longer gestation than control and in LBW infants the CP group had 368 g of birth weight higher than traditional care. No adverse outcomes with CP.	Results were particularly beneficial for infants who were born preterm in the CP group. There's a need for further research for the mechanisms behind these results. Group PC is a good alternative to individual prenatal care.	Level III High Quality

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Trotman, G., Chhatre, G., Darolia, R., Tefera, E., Damle, L., & Gomez-Lobo, V. (2015). The effect of Centering Pregnancy versus traditional prenatal care models on improved adolescent health behaviors in the perinatal period. *Journal of Pediatric & Adolescent Gynecology, 28*(5). 395-401. DOI 10.1007/s10995-009-0448-3	Discover if maternal health behaviors are improved in adolescents who participate in CenteringPregnancy (CP) rather than the traditional individual care model.	Convenience sample of 150 adolescents with low-risk pregnancies aged 11-21 who received PNC between 2008-2012 divided into three groups with 50 in each group. Study group- CP group Time matched control groups- single provider prenatal care group (SPPC) and multiple provider prenatal care group (MPPC)	Comparative retrospective chart review	Obtained from electronic medical record Weight gain during pregnancy Compliance to appointments Postpartum follow up Contraceptive use postpartum	PNC 100% attendance: CP 62%, MPPC 40.8%, SPPC 51.9% (CP v MPPC p=0.04) No significant difference in partner/family involvement. IOM gestational weight gain guidelines: CP 62%, MPPC 38%, SPPC 38% (p=0.02) Compliance with PP appointments: CP 68%, MPPC 48%, SPPC 42% (CP v SPPC p=0.04) Postpartum depression: CP 0%, MPPC 4%, SPPC 2% (v. MMC p=.02 and v. SPPC p=.03) Use of LARC CP 16%, MPPC 2%, SPPC 6% (v. MPPC p=0.03) No significant difference in amount of triage appointments, induction of labor, gestational age at delivery or type of delivery	CP may help mothers achieve healthy weight gain during pregnancy, reduced postpartum depression, increased PNC attendance, increased LARC use postpartum, and compliance with postpartum appointments. Recommend further research with randomized controlled trials and larger sample size.	Level III Good Quality; limited by small sample size and similar demographics. ~90% of participants African American provided for limited diversity. Same providers provided care for both CPPC and SPPC groups. Selection bias may have influenced results of CPPC group who may have had women who were more motivated to make healthy choices.

Citation	Purpose	Sample	Design	Measurement	Results/Conclusions	Recommendations	Level & Quality
Trudnak, T. E., Arboleda, E., Kirby, R. S., & Perrin, K. (2013). Outcomes of Latina women in CenteringPregnancy group prenatal care compared with individual prenatal care. *Journal of Midwifery & Women's Health, 58*. 396-403. DOI 10.1111/jmwh.12000	Compare pregnancy outcomes of Latina women who obtained either CenteringPregnancy or individual prenatal care.	487 Latina-Spanish speaking low-risk pregnant women. 247 CenteringPregnancy (CP) and 240 women in individual prenatal care (IPC) Women in ICP group were randomly selected from the comparison group with matched dates with CP group. Women in CP group tended to be younger (p=.01), more likely to have graduated from high school (p<.001), and more likely to be primiparous (p<.001).	Retrospective cohort study	Retrospective chart review. Logistical regression analysis was used to quantify maternal and birth outcomes.	No difference in preterm births or low birth weight based on group or women who gained more than the recommended amount of weight. -CP group had greater likelihood of obtaining "adequate" prenatal care CP 91%, ICP 63% (p<.01) CP more likely to attend 6 week postpartum visit CP 86%, ICP 74.6% (p<.01) CP were more likely to have vaginal birth than a primary cesearean CP 83.4%, ICP 77.1% (p=.02) CP women were less likely to gain below the recommended amount of weight CP 15%, ICP 33.4% (p=0.41)	CenteringPregnancy is effective in a Spanish speaking-Latina population to increase prenatal care attendance and six week postpartum visits as well as decreasing percentage of women who gain below the recommended weight in pregnancy.	Level III Good quality; limited generalizability in race and all of low-risk pregnancies