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Centering Pregnancy and Traditional Prenatal Care: A Comparison of Health Practices

Kaylynn Shakespear
Utah State University

CENTERING PREGNANCY AND TRADITIONAL PRENATAL CARE: A COMPARISON OF HEALTH PRACTICES

by

Kaylynn Shakespear

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Approved:

_____	_____
Phillip Waite, PhD Major Professor	Julie Gast, PhD Committee Member
_____	_____
Terry Peak, PhD Committee Member	Byron R. Burnham, EdD Dean of Graduate Studies

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ABSTRACT

CENTERING PREGNANCY AND TRADITIONAL PRENATAL CARE:

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by

Kaylynn Shakespear, Master of Science

Utah State University, 2008

Major Professor: Dr. Phillip J. Waite
Department of Health, Physical Education and Recreation

Centering Pregnancy is an alternative method of providing prenatal care with increased education and social support with health assessment in a group setting. This study, a cross-sectional, correlational, convenience-sample design, sought to determine the difference between women who receive prenatal care in Centering Pregnancy prenatal care and those in traditional prenatal care in regards to health behaviors. Adult pregnant women (n = 125) were surveyed from at least 28 weeks gestation. The sample comprised primarily White low-income women. Using multiple linear regression, it was determined that women in Centering Pregnancy had significantly lower index health behavior scores compared with the traditional care group (p = .01); those in Centering Pregnancy reported engaging in fewer health-promoting behaviors. Furthermore, those in Centering Pregnancy reported a lower perceived value of prenatal care in the current study. No

differences were observed for smoking and weight gain behaviors between groups. A number of health behaviors changed during pregnancy for both groups but no significant differences were found.

(100 pages)

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Kaylynn Shakespear

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CHAPTER 1

INTRODUCTION

The United States continues to have higher rates of infant mortality, death in first year of life, than other nations with similar health expenditures and health care systems (Guyer, Freedman, Strobion, & Sondick, 2000). The main contributors to infant death are congenital abnormalities (birth defects), premature birth (birth before 37 weeks gestation), and low birth weight (below 2500 grams or 5.5 lb) (Mathews & MacDorman, 2006). The United States infant mortality rate in 2003 was 6.84 per 1000 live births with 4.63 of these deaths occurring in the first month of life (neonatal period) (Mathews & MacDorman).

In response to the prevalence of preterm birth and low birth weight paired with no proven single mechanism to prevent preterm birth (Beuekens & Klebanoff, 2001), organizations have made both public health and clinical recommendations for prenatal care. These recommendations, broadly defined, state that prenatal care should be provided to all pregnant women and include risk assessment, health promotion, and medical and psychosocial intervention (U.S. Department of Health and Human Services [USDHHS], 2000; U.S. Public Health Service [USPHS], 1989).

Based upon these recommendations, Sharon Rising, a Certified Nurse Midwife, developed the Centering Pregnancy (CP) model of prenatal care in 1998. Care under this model employs a group approach to prenatal care where a patient is placed with 8-12

other women with similar delivery dates after their initial prenatal care appointment. All subsequent prenatal care appointments are conducted in a group setting that includes taking one's own vital signs and weight and a short semi-private physical examination by the care-provider, both occurring in the first 30-min of the appointment. In the following 90 min the care provider and other social service professionals lead an educational group discussion that fosters acquisition of new knowledge and skills and formation of supportive friendships (Rising, 1998).

Since its development in 1998, CP has been adopted in over 50 clinics (Carlson & Lowe, 2006) with over 700 health and social service professionals trained to implement the CP model (Walker & Rising, 2004). Additionally, many of the implementation sites are community clinics that serve low income women due to the cost effectiveness of the model (Carlson & Lowe, 2006).

The effectiveness of the CP model has been studied using multiple clinical and behavioral outcomes. Favorable results have been observed in the following variables: maternal knowledge of pregnancy (Baldwin, 2006; Ickovics et al., 2007), social support (Baldwin), patient satisfaction (Baldwin; Ickovics et al., 2007), compliance with caregivers recommendations (Baldwin; Guyer, et al., 2000; Ickovics et al., 2007), readiness for labor and delivery (Ickovics et al., 2007), incidence of preterm birth (Grady & Bloom, 2004; Ickovics et al., 2003, 2007), incidence of low birth weight (Grady & Bloom, 2004; Ickovics, 2003), and neonatal death (Ickovics, et al., 2003). However, in recent research, no differences between CP and traditional prenatal care were found in terms of maternal health locus of control (Baldwin) and mean birth weight (Grady &

Bloom; Ickovics, et al., 2003). As only one of the studies on CP have used random assignment and relatively few outcome variables have been researched, further research on CP is necessary to determine if CP is more effective than traditional prenatal care and, if so, how improved birth outcomes are achieved.

Because one of the three major components of CP is health education, the program is partially designed to improve health practices (Rising, 1998). To date only one study has been conducted that compared the health behaviors of women who receive health education included in CP to those of women who receive traditional prenatal care (Robertson, Aycock, & Darnell, 2008). The lack of research on health behaviors becomes more notable when one considers that preventive health behaviors are some of the most proven components of prenatal care (Fiscella, 1995; Lu, Tache, Alexander, Kotelchuck, & Halfon, 2003; McCormick & Siegel, 2001).

Purpose of the Study

By comparing the health practices of pregnant women in CP and traditional prenatal care, this study sought to guide public health professionals and clinicians regarding the type and content of the prenatal care they provide.

Research Questions

The study sought to answer the following questions:

1. In comparison to women receiving traditional prenatal care, do women receiving care under the CP model have better health practices as scored by an index health behavior scale?

2. In comparison to women receiving traditional prenatal care, are women receiving care under the CP model more likely to seek to gain a recommended amount of weight?
3. In comparison to women receiving traditional prenatal care, are women receiving care under the CP model less likely to smoke during pregnancy?
4. In comparison to women receiving traditional prenatal care, do women receiving care under the CP model value their prenatal care experience more?
5. In comparison to women receiving traditional prenatal care, do women receiving care under the CP model report changing more health behaviors during pregnancy?

Limitations

1. As this study employed a cross-sectional, two-group design using non random assignment, causality and group differences cannot be established with certainty.
2. This study utilized the Health Practices in Pregnancy Questionnaire-II, a self-report instrument. Behaviors may not have been accurately measured using this type of instrument. Additionally, this instrument does not measure all possible health behaviors that are important during pregnancy
3. Study participants may not have report their behaviors honestly.

Delimitations

1. The sample was drawn from a clinic with a high percentage of low income women.

2. The sample was one of convenience.

Definitions of Terms

Positive health practices: behaviors that improve a woman's health, the health of her fetus, or the pregnancy's outcome. (i.e., weight gain, nutritional intake, appropriate rest)

Traditional prenatal care: one-on-one clinical care provided to a woman during pregnancy by a clinical care provider with medical assessment and treatment is the main goal.

CP model: a method of prenatal care administration which occurs in groups with pregnant women of similar gestational age that includes large amounts of social support and education

Preterm birth: delivery of a live fetus before the completion of the 37th week of pregnancy

Neonatal period: the 30 day period immediately following delivery of a live fetus

Low-birth weight: weight at birth below 5.5 lb (2500 grams)

Parity: Number of previous pregnancies that resulted in a delivery of a fetus

CHAPTER 2

REVIEW OF THE LITERATURE

This chapter will provide a review of the literature that addresses traditional prenatal care's history, objectives, recommended and actual content, and clinical and behavioral effects on pregnant women and their fetus. The content of prenatal care following the CP model will be reviewed as well as evaluations of the clinical, attitudinal, knowledge, and behavioral differences between women who received care in CP groups and those in traditional prenatal care.

History of Prenatal Care

In 1901, Ballantyne suggested that pregnant women visit a physician during pregnancy (Ballantyne, 1901). This initial suggestion for prenatal care was based on the view that prenatal care would reduce the risk of death related to preeclampsia (Walker & Rising, 2004). As early as 1915, research indicated that prenatal care might decrease infant mortality (Williams, 1915). This and other research supporting the efficacy, cost effectiveness, and necessity of prenatal care (Hamilton, 1987; Lobenstine, 1922) led both the Metropolitan Insurance Company and the federal government through the Sheppard-Towner Maternity and Infancy Protection Act of 1921 to fund prenatal care. However, in 1929 federal funding of the Act ended as some (e.g., the American Medical Association) viewed it as a step towards socialized medicine. Notably, the prenatal care of this time period differed greatly from current prenatal care. At that time, prenatal care consisted of

nutrition and hygiene education, minimal vital sign observation by visiting nurses, and services provided by a social worker, if needed. In the 1930s treatments began to develop that aided in clinical monitoring and treatment of pregnancy including simple vital sign observation, urinalysis, testing for sexually transmitted diseases, and pelvic measurements. These new developments continued with ultrasound, Rh antigen testing, diabetes treatment, diethylstilbestrol, thalidomide, tetracycline, screening for serum alpha-fetoprotien, and other genetic testing in the 1950s through 1980s. During this period, professional organizations concerned with prenatal care were also founded including the *American College of Obstetricians and Gynecologist* in 1951, the *American College of Nurse-Midwives* in 1959, and the *Nurses Association of the American College of Obstetricians and Gynecologists* in 1969. With all of the new techniques and discussion, prenatal care became primarily a clinical service rather than one that provided education and social services as it initially began (Thompson, Walsh, & Merkatz, 1990). Despite the medical advances in care, as recently as 1962 researchers began to question the effectiveness of prenatal care in preventing infant mortality, low birth weight, preterm birth, or other negative birth outcomes(Alexander & Kotelchuck, 2001). Regardless, government programs gradually expanded prenatal care coverage, likely due to government pressure by professional organizations, to provide prenatal care to otherwise uninsured or uninformed pregnant women, thus making prenatal care the most widely implemented preventative health measure in the United States (Alexander & Kotelchuck, 2001; Thompson et al.).

The content of prenatal care has evolved over time with the development of even more technologies and guidelines. In *Caring for our Future: The Content of Prenatal Care* (USPHS, 1989), the government outlined the suggested content for prenatal care for pregnant women in the United States. This document, which remains a gold standard for care, suggests that prenatal care clinicians provide: (a) risk assessment, (b) medical and psychosocial intervention, and (c) health promotion. It is suggested that these services focus on improving outcomes for the pregnancy by increasing overall wellness before, during, and after pregnancy; reducing mortality, morbidity, fetal loss, and unneeded medical intervention; reduce risks of illness in intrapregnancy periods and after childbearing years; and building up parenting skills. In regards to fetus and infant health, prenatal care should increase wellbeing; reduce preterm birth, intrauterine growth retardation, congenital anomalies, and failure to thrive; promote healthy growth, immunization and pediatric care; reduce neurologic, developmental, and other morbidities; reduce abuse, neglect, injuries, acute and chronic illness, and need for extended hospitalization after birth. Furthermore, prenatal care should promote positive parent-infant interaction, reduce future unintended pregnancies, and identify behavior disorders that may lead to neglect and family violence (USPHS).

In 2002, the American Academy of Pediatrics (AAP) and American College of Gynecology (ACOG) jointly developed their *Guidelines for Perinatal Care*, providing an industry standard for care. Within this publication it is recommended that prenatal care providers coordinate medical care with psychosocial support from the preconception period through delivery and postpartum care. Additionally, physicians should assess the

parent's attitudes toward the pregnancy, availability of support, and need for parenting preparation as well as encourage development of a birthing plan and making informed choices about pregnancy, labor, delivery, and postpartum care. Within prenatal care pregnant women should be screened and/or educated regarding typical prenatal care and when or when not to contact a physician, physical disabilities, sauna and hot tub use, nutrition, exercise, tobacco use, substance use and abuse, and domestic violence. Patients should also receive information regarding employment and air travel during pregnancy, childbirth education classes, other labor and delivery concerns, breastfeeding, and circumcision. Though the guidelines in this document do not differ greatly from the Public Health Service guidelines, the call for integrated care focused on prevention was a vital step forward for prenatal care (APA & ACOG, 2007).

Prenatal Care

The most recent National Vital Statistics Report (Mathews & MacDorman, 2006) on infant mortality, consistent with past research, found the infant mortality rate of mothers who did not receive prenatal care or initiated prenatal care after the first trimester, was 8.96 per 1,000 live births in the United States. Comparatively, for women who receive prenatal care beginning in the first trimester the infant mortality rate was 6.20 per 1,000 live births (Mathews & MacDorman). The overall infant mortality rate for the United States in 2006 was 6.6 per 1,000 live births (United Nations, 2008).

Healthy People 2010 (USDHHS, 2000) called for an increase in the number of pregnant women who receive early and adequate prenatal care in the United States. The

baseline data for the document collected in 1999, states that, of live deliveries, 83% received prenatal care beginning in the first trimester of pregnancy. The target percentage to be reached by 2010, for this behavior is 90%. Improvement was reported in the *Healthy People 2010 Midcourse Review*, early prenatal care was reported to be 14% higher than the baseline data, meaning that this goal has been met (USDHHS). Additionally, 74% of live birth deliveries, in 1999, received both early (in the first trimester) and adequate prenatal care continued through delivery. The corresponding *Healthy People 2010* objective for this behavior is that 90% of pregnant women to receive suggested amounts of prenatal care by 2010. Improvement in this area has been slower with current data showing a 6% improvement, still 10% lower than the target set by *Healthy People 2010*. (USDHHS)

Unfortunately, there are conflicting reports regarding the efficacy and mechanisms of action through which prenatal care lowers infant mortality. A review conducted by Lu et al. (2003), assessing the evidence of the three content areas of prenatal care, risk assessment, health promotion, and medical and psychosocial intervention in preventing low birth weight and its correlates--preterm birth and intrauterine growth restriction. A total of 108 sources of original research, systematic reviews, and meta-analyses were compiled for the content areas and were rated for the quality of their evidence using the United States Preventative Services Task Force rating system (Harris, Helfand, & Woolf, 2001). Net benefit and harms found for each clinical service were ranked as being substantial, moderate, small, and zero/negative. Conclusions regarding benefit or harm of a given clinical service were taken from other meta-

analyses. When these were not available original research was considered after being weighted based upon the quality of study (Lu et al.).

Results for the eight types of risk assessment found the quality of evidence to range from fair to poor depending on assessment type. The 18 different types of medical and psychosocial interventions were determined to have poor to fair quality of evidence. In regard to net benefit, 11 of these intervention types were found to have a zero/negative benefit, two interventions were found to have a small/zero benefit, three interventions were found to have a small benefit, one intervention was found to have a moderate benefit, while one intervention was found to have substantial benefit. Six health promotion efforts were reviewed and were determined to have fair quality of evidence except for work counseling/restrictions which was ranked as poor. Net benefit for each of the interventions was determined as follows: smoking cessation had a small benefit, the Women Infants and Children program had a moderate benefit, macronutrient/micronutrient supplementation a zero/negative effect, work counseling/restrictions an undetermined effect, and preterm birth education a zero/ negative effect. Of note, however, all interventions whether provided in prenatal care or in an ancillary service were included in the review (Lu et al., 2003).

In a review of higher methodological quality, Fiscella (1995) used four steps to determine the efficacy of prenatal care. These steps were: (a) grading study design, (b) evaluating causal relationship, (c) determining the quality and strength of the evidence, and (d) making recommendations based on previous steps. The researcher reviewed the body of literature from 1966-1994 and used low birth weight as a proxy measure for

infant mortality because it is the leading cause of infant mortality, is easily quantifiable, requires a lower sample size, and is the most commonly researched variable. Fifty studies of various designs were included in the review. Overall, the researcher found insufficient evidence to determine a causal relationship between prenatal care as a whole and reduction of low birth weight. This is likely due to the lack of control for confounding variables in the body of research and inability to establish a dose-response relationship. However, a moderate relationship between prenatal care expansions and a decrease in low birth weight was observed (Ficella).

In a systematic review of 111 prenatal care studies, Alexander and Korenbrot (1995) determined that a relationship between prenatal care and low birth weight cannot be established when flaws in measurement of adequate prenatal care and selection bias in prenatal care enrollment are not accounted for. The researchers also considered the individual components of prenatal care leading to the conclusion that prenatal care can best affect birth weight through smoking cessation or reduction, nutritional education to improve weight gain, and medical treatment of infections or other diseases that may cause intrauterine growth restriction or preterm birth (Alexander & Korenbrot).

As reported in these reviews, research has not established the efficacy of prenatal care as a whole or for many of the individual components of prenatal care. Exceptions, which were primarily behavioral, included smoking cessation counseling, nutrition and weight gain education, and treatment of infection.

Traditional Prenatal Care and Health Behaviors

The effect of behavioral interventions imbedded in prenatal care on low birth weight was affirmed by Sable and Herman (1997). Using a the National Institute of Child Health and Human Development/Missouri Maternal and Infant Health Survey (MMIHS) dataset (Pierson et al., 1994), a case-control study of all (*N* = 2205) Missouri residents very low birth weight infants (< 1500 gm) were matched with one low birth weight infants (1500 – 2499 gm) and one normal birth weight infant (2500+ gm). The data set included 76% of the very low birth weight infants born. Logistic regression was employed to control for the following variables: maternal age, marital status, maternal education, maternal ethnicity, smoking during pregnancy, adequacy of prenatal care, employment status during pregnancy, previous adverse birth outcome, parity and hypertension. Using these methods, the researcher found women who reported discussing fewer than the seven tested topics were 1.38 times more likely to deliver a very low birth weight infant than a normal birth weight infant. The risk of delivering a moderately low birth weight infant did not differ based upon other prenatal care content. The authors pointed out, however, that women who recalled receiving advice were more likely to have implemented the corresponding behavior change than those that may not have recalled the counsel even though they were provided the service (Sable & Herman, 1997).

Within the same study, Sable and Herman (1997) found clinicians were not adequately implementing recommended health promotion into their practice with the exception of the recommendation to take prenatal vitamins 93% of the time. The

remaining content areas were discussed less than 63% of the time. The researchers found 37.6% of the sample recalled being counseled to consider breastfeeding. Regarding alcohol consumption, 39.4% of women surveyed were told to cut down or stop consuming alcohol. Advice to quit smoking was reported by 53.9% of the women and 47.1% received advice to stop illegal drug use. In addition, diet and nutrition advice was recalled as being received by 54.8% of the sample. Surprisingly, women recalled receiving weight gain advice only 62.1% of the time. Comparatively, the researchers found women recalled physicians referring them to read books or pamphlets on pregnancy 60.9% of the time. From this study the researchers concluded health promotion is not sufficiently implemented in traditional prenatal care and has an inverse relationship with low birth weight (Sable & Herman). One mechanism though which health promotion can affect birth outcomes, is its influence on a woman's health behavior during pregnancy.

Vonderheid, Noor, and Handler (2007) studied the reported content of prenatal care and its relation to health practices with a convenience sample (N = 159) of African-American and Mexican American women. The sample included women over the age of 16 that had attended at least three prenatal care visits before data collection at 28-36 weeks. Data were collected via face-to-face interviews while women were waiting to see their clinician. Of the 22 health promotion topics surveyed, women reported receiving advice regarding an average of 17 topics while only 10% reported discussing all 22 topics. Higher number of topics discuss were statistically significantly correlated with more prenatal care visits (r = 1.3, p =.05), being African-American (t = -3.09, p = .002),

lower substance use before pregnancy (r = .13, p = .04), wanting/ needing to discuss more topics (r = .42, p = .000), being in a midwifery group (t = 4. 19, p = .000), living in public housing (t = -2.48, p = .01), having a primary care provider (t = -4.81, p = .000), and being a different race than the care provider (t = 4.17, p = .000). Additionally, the researchers found that positive health practices in general were associated with attitude toward pregnancy (r = .35, p =.01), using fewer substances pre-pregnancy (r = -.37, p = .000), and discussing more health promotion topics while in prenatal care (r = .25, p =.001). Using multiple regression, it was determined that age, ethnicity, number of prenatal care visits, pre-pregnancy substance use, and attitude toward pregnancy predicted 30% of the health behaviors the sample engaged in (Vonderheid et al. 2007).

In an effort to determine how pregnant women at their first prenatal care visit, independent of clinical health promotion, had changed their behaviors and the sources for their health information during pregnancy Lewallen (2004) conducted a qualitative study. Data was collected by interviewing 150 pregnant women at their first or second prenatal care visit. Study participants were asked: “Other than coming to the clinic, what kinds of things do you do to stay healthy during pregnancy or to have a healthy baby?” and “How did you know to do those things?,” imbedded in a 30-min interview performed in a public health clinic. Women’s responses included the following elements listed in order of the number of times they were mentioned: changing their diet (422), physical activity (153), reduction of substance use (64), and self-awareness (40). Twenty-one women reported no behavior changes. The main sources for information regarding pregnancy and behavior

included: intuition (77), reading (72), family (58), and health care personnel (40) (Lewallen).

Lindgren (2003) studied the psychosocial and demographic factors that predicted general health practices during pregnancy. The sample (n = 252) was selected from inner-city and small urban clinics in the Midwest. Using mailed surveys, women over 18 years between 20 - 40 weeks gestation reported demographic, maternal-fetal attachment, depression, and health practices. The researchers found women from the inner city had statistically significantly lower health behavior scores than those in smaller urban areas (t = 6.10, $p < .05$). The individual practices where statistically significant differences existed were exercise ($p < .05$), fruit ($p < .05$) and vegetable consumption ($p < .05$), consumption of dairy products ($p < .05$), taking prenatal vitamins daily ($p < .05$), limited caffeine consumption ($p < .05$), prenatal care attendance before 4th month gestation ($p < .05$), regular attendance of prenatal care ($p < .05$), and avoidance of street drugs ($p < .05$) (Lindgren).

Another study that sought to identify psychosocial and demographic factors related to general health behaviors during pregnancy was conducted by Walker, Cooney, and Riggs (1999). The sample included 112 women between 6 - 10 weeks gestation who were primarily white (75%) and participants in a prenatal class that discusses nutrition, weight gain, pregnancy discomfort, growth of fetus, prenatal care visits, and alcohol, tobacco, and other drug use. Lower quality health behaviors were found to be statistically correlated with social support (r = -.38, $p < .0001$), depressive symptoms (r = .45, $p < .0001$), fetal-health locus of control (r = -.42, $p < .0001$), women's body image (r = .17,

$p < .07$), race/ethnicity ($p < .03$), education ($r = -33$, $p < .01$), and family income($r = .27$, $p < .01$). The variables that best explained health behaviors, accounting for 37% of the variance, were, in order of model entry depressive symptom, internal fetal locus of control, and family income (Walker et al.).

From this body of research, it can be concluded that the amount of health promotion a woman receives in prenatal care is predictive of birth weight. The amount of health promotion in prenatal care is predicted by receiving more prenatal care, being African American, lower substance use pre-pregnancy, wanting to discuss health behavior with clinician, participation in a midwifery group, living in public housing, having a primary care provider and being a different race than the prenatal care provider. General health behaviors during pregnancy are predicted by age, race/ethnicity, number of prenatal care visits attended, pre-pregnancy substance use, attitude toward pregnancy, living in an inner city, level of perceived social support, depression, fetal-health locus of control, body image, and income.

Cigarette Smoking and Prenatal Care

Specific health behaviors engaged in by pregnant women, particularly smoking and nutrition/weight gain, have also been studied. Beck and coauthors (2002), used the Pregnancy Risk Assessment and Monitoring System (PRAMS; Gilbert, Johnson, & Morrow, 1999) data, which is intended to identify the occurrence of health behaviors before, during and after pregnancy among mothers living in a participating state. PRAMS data were collected by each of the participating states (Alabama, Alaska, Arkansas, Colorado, Florida, Illinois, Louisiana, Maine, New Mexico, New York, North

Carolina, Ohio, Oklahoma, South Carolina, Utah, Washington, and West Virginia). Each state randomly sampled 100-300 mothers who delivered 2-3 months previously and mailed them a self-administered survey that assesses what behaviors women engage in before, during, and after pregnancy. Data from 17 of the participating states were used to ensure attrition did not skew the data. The behavioral data were linked to birth certificate data and weighted using CDC's guidelines to adjust for nonresponse and to ensure data represented minority groups. Smoking rates during the last three months of pregnancy were found to range from 6.2-27.2% depending on state of residence. Smoking during pregnancy is more common in white than African American women, those with less than a high school education, and women covered by Medicaid (Beck et al.).

More recently, Phares et al. (2004), in an analysis of the PRAMS data from 2000-2001, used data from eight states to determine smoking rates during pregnancy that ranged from 9-17.4% depending on the state. The researchers found smoking in the last three months of pregnancy to be predicted by young age, being white or American Indian, non-Hispanic, having less than 12 years education, and having a low income (Phares et al.).

Suellentrop Morrow, Williams, and D'Angelo (2006), using the 2000-2003 PRAMS data from 18 states, found that, depending on state of residence, 72.5-96.1% of pregnant women abstain from smoking during pregnancy depending on state. It was also found that, of women that smoked before pregnancy, 30.2-65.8% of women stopped smoking during pregnancy. Unfortunately this study did not identify predictors of smoking during pregnancy or smoking cessation (Suellentrop et al.).

Bailey (2006) studied the predictors of smoking during pregnancy among 148 women in the Southern Appalachia region who smoked pre-pregnancy. Women in the sample tended to be white, unmarried, of low socioeconomic status and resided in rural areas. Medical chart audits were used to collect data. In the sample 30% of the study participants stopped smoking while 40% reduced the number of cigarettes used per day. The quitting, reducing, and maintaining groups were different on six variables. Quitters had statistically significantly higher income ($p < .05$), participated in ancillary prenatal care services ($p < .03$), smoked less daily before pregnancy ($p < .001$), and had smoked for a shorter period of time before conception in comparison than the reducing and maintaining groups ($p < .03$). Maintainers had statistically significantly more previous pregnancies ($p < .04$). Alcohol consumption before pregnancy was higher than quitters and statistically significantly higher than maintainers ($p < .01$). Number of cigarettes smoked per day pre-pregnancy, adequacy of prenatal care, years smoking pre-pregnancy, income, and number of previous pregnancies predicted 43% of the variance in smoking cessation status during pregnancy (Bailey).

Haslam and Lawrence (2004) studied the health-related behaviors and beliefs in relation to prenatal smoking of 1,203 women in the United Kingdom. Data were collected using a self-report questionnaire that included measures of SES, smoking status, smoking stage of change, alcohol use, folic acid consumption, vitamin and iron supplement use, and locus of control. Using chi-square analysis it was determined that women who smoked during pregnancy had lower quality health behaviors during pregnancy including lower folic acid consumption ($\chi^2 = 3.43$, $p < .001$) and vitamin and iron supplementation

(χ^2= 70.56, $p < .05$). Women in the precontemplation group, in comparison to study participants in other stages of change, were less educated ($\chi^2 = 64.95$, $p < .001$), live with a smoker ($\chi^2 = 104.76$, $p < .001$), had low SES ($\chi^2 = 76.07$, $p < .001$), and had high external locus of control ($\chi^2 = 19.79$, $p < .02$). Internal locus of control participants were more likely to have finished formal education ($\chi^2 = 28.73$, $p < .001$), hold more qualifications ($\chi^2 = 62.69$, $p < .001$), not smoke during pregnancy ($\chi^2 = 19.63$, $p < .001$), have a higher SES ($\chi^2 = 36.\ 27$, $p < .001$), and increased folic acid intake ($\chi^2 = 13.60$, $p < .001$) (Haslam & Lawrence).

As cited in the research presented above, smoking during pregnancy seems to be more common among white and American Indian, less educated and younger women. Furthermore, smoking during pregnancy is predicted by Medicaid enrollment, having an external locus of control, and not engaging in other positive health behaviors.

Maternal Weight Gain

Adequate maternal weight gain has been found to decrease the risk of low birth weight, preterm delivery, preeclampsia, caesarian delivery, instrumental delivery, large for gestational age, infant death and other complications (Cedergren, 2006; Ehrenberg, Dierker, Milluzzi, & Mercer, 2003; Rode et al., 2007; Shapiro, Sutija, & Bush, 2000; Thorsdottir, Torfadottir, Birgisdottir, & Geirsson, 2002).

The psychosocial predictors of adequate maternal weight gain were studied by Strychar et al. (2000). One-hundred fifteen women French-speaking women in Quebec, Canada were interviewed at 16 and 36 weeks gestation and 1 to 7 days after delivery regarding their weight gain, knowledge, attitudes, dietary intake, and reception of weight

gain advice from a physician or dietitian. Demographics were also collected. The researchers found inadequate weight gain at end of pregnancy was predicted by inadequate weight gain at 16 weeks ($p < .05$), not having talked to a physician about weight gain at 16 weeks ($p < .05$), attitude regarding weight gain at end of pregnancy ($p < .05$), and less knowledge of nutrition recommendations for pregnant women ($p < .05$). The author was unclear regarding what data collection point was used for knowledge as a predictor of weight gain. Demographic variables were not found to explain weight gain (Strychar et al.).

Olson and Strawderman (2003) sought to identify the relationship between psychosocial and behavioral qualities and maternal weight gain after controlling for sociodemographic and biologic characteristics. The researchers used a sample ($n = 622$) of primarily white women who gave birth in a two year period in a ten-county area of New York state. Women reported health behavior and psychosocial information in a mailed in survey while chart audits were used to collect biologic and sociodemographic information. Gestational weight gain was measured by using weight as measured before the 11th week gestation and last prenatal visit before delivery. For the 75 women who joined the study beyond the eleventh week a mathematical adjustment was used to estimate weight between the ninth and 11th week gestation. Results for this sample found that only 38% of the women gained a recommended amount of weight. Only 60% of the women reported receiving advice regarding the amount of weight they should gain. The final regression equation explained 27% of weight gain in the sample. Decreased physical activity lead to statistically significantly more weight gain than if it was increased or

maintained physical activity (2.47 lb, $p < .01$). Particularly low (3.67 lb, $p < .001$) or high (-3.16 lb, $p < .05$) amounts of weight gain were related to decreased or increased consumption of food, respectively. More specifically, increased fruit and vegetable intake was related to less, although not necessarily insufficient, weight gain (-1.83 lb, $p < .05$). Cigarette smoking was a statistically significant predictor of weight gaining as women who smoked gained 11.59 pounds less than their non-smoking counterparts ($p < .0001$). Low availability of social support was related to increased weight gain among those with low, normal or obese BMI groups at beginning of pregnancy (2.81 lb, $p < .01$) when compared to women with normal or high levels of social support. Previous live birth (-4.08 lb, $p < .01$), HMO insurance (-2.32 lb, $p < .01$), low or obese BMI at beginning of pregnancy (-3.30 lb, $p < .05$, -7.87 lb, $p < .0001$, respectively), and being over 40 years-old (7.26 lb, $p < .01$) were also statistically significant predictors of low maternal weight gain (Olson & Strawderman, 2003).

Cogswell, Scalon, Fein, and Schieve (1999) studied the correlation between clinical weight gain advice, women's self-conceived target weight gain, and actual weight gain. By collecting self-administered surveys from mainly white, middle-class women ($n = 2237$) the researcher found that advice regarding how much weight a woman should gain is statistically significantly associated with amount of actual weight gain (95% CI 2.3, 5.5). Furthermore, 63% of the sample reported receiving no advice (27%) or advice below (14%) or above (22%) the Institute of Medicines recommendations (Cogswell et al.).

In a study of psychosocial variables and weight gain, Walker and Kim (2002) used a sample of 305 African-American, Hispanic and White women after their full-term, singleton, Medicaid covered pregnancy. By using the Center for Epidemiologic Studies Depression Scale, Self Care Inventory, Food Habits Questionnaire, gestational weight gain, and birth weight data were collected and analyzed for ethnic differences. Pearson product-moment correlations and multiple regression were used to determine the relationship between psychosocial measures and gestational weight gain and birth weight. No statistically significant differences were found for psychosocial variables and ethnicity or perinatal weight gain. The multiple regression analysis found that psychosocial variables (depressive symptoms, self care, and food habits) did not statistically significantly improve upon the prediction model that only included demographic variables (pre-pregnancy BMI, newborn gender, maternal height, and African American ethnic) (Walker & Kim).

Johnson, Hellerstedt, and Pirie (2002) examined the relationship between abuse and prenatal weight gain. Using a sample of 579 women and medical chart audit data collection methods, information regarding maternal age, past and current abuse, and weight gain were collected. Using multiple regression analysis the authors determined weight gain in pregnant teens is not affected by past or current abuse (*OR* = .70, *CI* = .32, 1.24). However, among adults with current weight gain was 6.9 pounds higher than those not experiencing abuse (*OR* = 2.20, *CI* = 1.10, 4.53). Inadequate weight gain was statistically significantly predicted by past physical (*OR* = 1.99, *CI* = 1.34, 7.34) and

sexual (*OR* = 2.99, *CI* = 1.03, 8.82) abuse. Additionally, excessive prenatal weight gain was significantly predicted by current abuse ($p < .03$). (Johnson et al.)

In study of predictors of weight gain in Colorado, Wells, Schwalber, Noonan, and Garbor (2006) used a PRAMS data (n = 4,528) to identify which biological, psychosocial, and behavioral characteristics are associated with insufficient and excessive weight gain. The specific predictor variables included area of residence, education maternal age, parity, race/ethnicity, Medicaid enrollment, WIC participation, use of cigarettes and alcohol, pregnancy intention, maternal stress, preterm labor, diabetes, nausea, and high blood pressure. Of the study participants, 23.8% gained excessive amounts of weight, 41% gained recommended, and 35.2% gained inadequate amounts of weight. Using bivariate analysis inadequate weight gain was found to be related to having previous pregnancies ($p < .001$), being below weight before pregnancy ($p < .001$), morning sickness ($p < .001$), and preterm labor ($p < .01$). Using the same analytical method, excessive weight gain was predicted by being nulliparous ($p < .001$), being overweight or obese before pregnancy ($p < .001$), high blood pressure ($p < .001$), diabetes ($p < .01$), living in Denver or another metropolitan area ($p < .01$), and being non-Hispanic ($p < .001$). In the final regression model parity (*OR* = 0.69, *CI* = .57, .82), pre-pregnancy BMI (underweight: *OR* = .52, *CI* = .39, .68; obesity: *OR* = 18.61 *CI* = 11.71, 29.57; overweight: *OR* = 2.65, *CI* = 2.04, 3.44), preterm labor (*OR* = 1.29, *CI* = 1.03, 1.60), nausea (*OR* = .79 *CI* = .64, .99), and maternal education (*OR* = 1.25, *CI* = 1.01, 1.44) were statistically significant predictors of total weight gain during pregnancy (Wells et al.).

Brawarsky et al. (2005) examined diet during pregnancy, pre-pregnancy height and weight, weight at last prenatal care visit, demographics, gestational age, parity, chronic pregnancy medical conditions, physician advice regarding weight gain, exercise, cigarette use, and self-reported stress. With a sample of 1100 racially diverse women, it was found 65% of the women received advice regarding weight gain but only 73% of this advice was consistent with the IOM recommendations. Fifteen percent of women had inadequate weight gain with 53% classified as have excessive weight gain. Excessive weight gain was predicted by being overweight pre-pregnancy (*OR* = 2.26, *CI* = 1.43, 3.56), taller, no previous pregnancy (*OR* = 1.49, *CI* = 1.08, 2.04), and frequent acid reflux in the 3rd trimester (*OR* = 1.57, *CI* = 1.10, 2.24). Inadequate weight gain was correlated with chronic or gestational diabetes (*OR* = 2.70, *CI* = 1.18, 2.19), low dairy consumption (*OR* = 1.74, *CI* = 1.06-2.87), and no previous pregnancy (*OR* = .62, *CI* = 39, .99) (Brawarsky et al.).

The literature as presented in this section indicates that low maternal weight gain is influenced by pre-pregnancy weight, weight gain before 16th week of pregnancy, attitude about weight gain, not receiving advice about weight gain before the 16 weeks gestation, inadequate knowledge of weight gain recommendations, increased physical activity, decreased food intake, smoking, and lower levels of social support.

Centering Pregnancy

With the understanding that positive health behaviors during pregnancy are predicted by the amount of health promotion provided in prenatal care, care providers

have developed multiple programs to educate their patients. Although some are performed individually, most of these programs employ a group education approach. There is a marked lack of research determining which approach is best suited to provide health promotion during pregnancy. Prenatal care providers, however, report that group approaches provide opportunities for education that would not otherwise occur in traditional prenatal care. Herzig and others (2006), in a qualitative study of how prenatal care providers address patients health behaviors, found three recurrent themes among the study respondents. First, providers have a policy of addressing one risk at a time, followed by the belief that there are useful methods for addressing specific behaviors. Additionally, care providers stated they sought to address social isolation or depression to facilitate behavior change during prenatal care. Furthermore, study participants stated that group approaches allowed for deeper discussion of certain health behaviors that would otherwise be uncomfortable or impossible in a one-on-one care situation (Herzig et al.).

Centering Pregnancy (CP) was created by Rising (1998) to improve prenatal care. Based upon the Childbearing Childrearing Center model of care (Rising & Lindell, 1982), this model of care was created with the intent to centralize the PHS suggested components of prenatal care (USPHS, 1989), risk assessment, education, and psychosocial support, into one service. This is done by providing prenatal care in a group setting with women of similar gestational age. The culture of CP groups is intended to foster an environment in which participants can learn from others; build a stronger community support network for participants and their families; and encourage

participants to be open to attitude change; develop new insights regarding pregnancy, their health status, behavior and their future as a parent; provide mutual support; and learn problem solving skills which fosters self care during pregnancy (Rising).

Content

In the CP model of care (see Figure 1) women receive their initial prenatal assessment in a traditional care provider-patient setting. The remaining ten appointments however, are conducted in a group setting with standardized care components rarely deviated from unless a specific need exists (Rising, 2007). Each group is made up of eight to ten pregnant women with similar delivery dates and their partner if they elect to attend. Appointments are typically two-hours long and consist of doctor administered risk assessments, patient administered risk assessments, and a 90-minute educational discussion.

Risk assessments include laboratory blood test and pelvic and physical examination at the initial prenatal care appointment. Further assessments occur during abbreviated meetings where the fundus is measured along with fetal heart tones. This time also allows the expectant mother to ask any questions and monitor her fetus's development. Additionally, members of the group weigh themselves, measure their blood pressure, and chart their progress. If, for any reason, the clinician determines additional care is needed, appointments for follow up are made. The educational and support component of the program can be led by social workers, nutritionists, physical therapists, birthing unit nurses and previous patient parent educators (Rising, 1998). The discussion topics are nutrition, exercise, relaxation techniques, understanding pregnancy problems,

infant care and feeding, postpartum issues including contraception, communication and self-esteem, comfort measures in pregnancy, sexuality and childbearing, abuse issues, parenting, and childbirth preparation (Massey, Rising, & Ickovics, 2006). The program is intended for all pregnant women but this program has been implemented most frequently in community clinics serving the uninsured as CP is a more cost effective model of care (Carlson & Lowe, 2006).

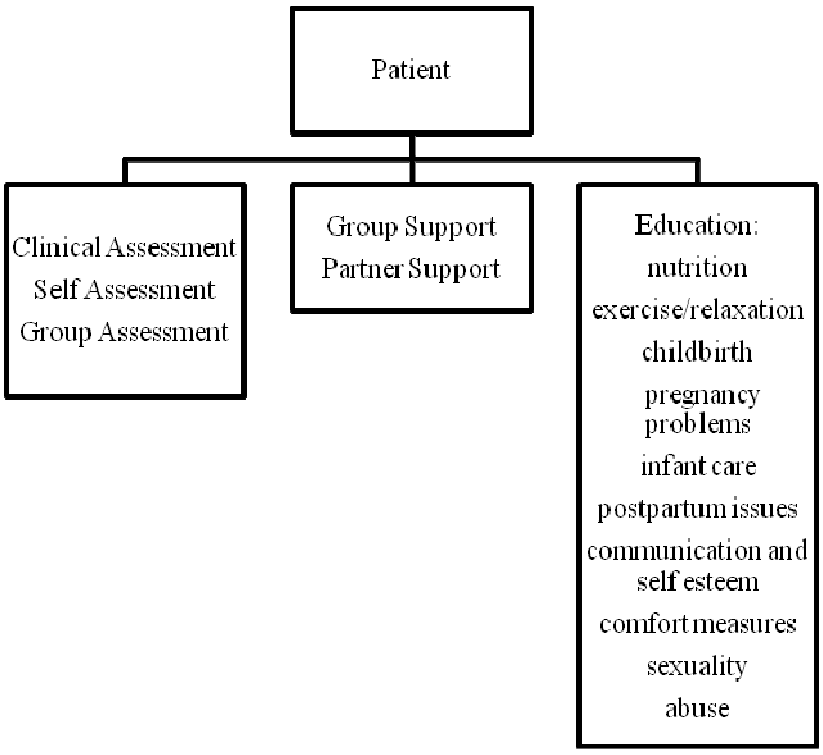

Figure 1: Major components of Centering Pregnancy model of care.

Evaluations of Centering Pregnancy

The CP Model has been evaluated by five studies to date. Due to the limited number of studies all outcomes, including, knowledge, attitude, practices, beliefs, and birth outcomes, will be reported for the prenatal and postnatal period.

Ickovics and colleagues (2007) conducted a randomized controlled trial in two university hospital prenatal clinics. In addition to other outcomes, the study was developed to determine if CP prenatal care improved knowledge of pregnancy. With a sample of 1,047 (n = 623 and n = 370 for CP and traditional groups, respectively) women ages 14-25 years, the majority of whom were African American, the study randomly assigned women to CP or traditional prenatal care. Despite the randomization the study participants in the CP group included more African Americans, fewer individuals with a history of preterm birth, and more individuals with prenatal distress. All analyses statistically controlled for these variables. Prenatal and infant care knowledge was measured using an instrument developed by the study authors and was not validated. The measure was administered using computer-assisted self-interviewing. The researchers observed significantly higher knowledge scores (F = 27.08, p < .001) for those in CP. Mean scores differed from 41.1 for CP and 38.5 traditional prenatal care (Ickovics et al.).

Robertson, and colleagues (2008) also assessed knowledge but did so among a small sample (n = 49) of Hispanic women. Using a Spanish version of the Prenatal/Postnatal Care Knowledge Scale (Ickovics, 2003b) administered at 34-36 weeks gestation the authors concluded that there was not a significant difference between the traditional and CP groups. The study was limited due to small sample size.

Knowledge was also measured in a study designed to determine the difference between women receiving typical prenatal care (n = 50) and CP prenatal care in selected outcomes, Baldwin (2006) used a sample of women (n = 48) receiving care at four clinical sites throughout the United States. Members of the sample were self-placed into the CP or traditional treatment from a certified nurse midwife being assessed at 12-16 weeks and after the 32nd week gestation. This evaluation used a self-report 12-item, true-false, knowledge assessment questionnaire (Rising, 1998) completed by the control and CP groups. Content validity was determined by certified nurse midwives with a Kuder-Richardson 20 reliability scores of .69 and .68 at pre- and post test, respectively (Baldwin). This study yielded results suggesting CP patients learn statistically significantly more ($p < .03$) during pregnancy than those in traditional care. Mean scores of 10.4 at pretest improved to 11.38. In comparison, the traditional prenatal care group mean scores were 10.48 and 10.88 at pre- and post test, respectively (Baldwin).

Both health attitudes and attitudes toward CP have been studied and include sense of participation, patient satisfaction with prenatal care services, health locus of control, prenatal distress, readiness for labor and delivery, and readiness for infant care. Baldwin (2006) assessed the sense of participation felt by the members of the different treatment conditions. Using Littlefield and Adams Participation and Satisfaction tool (Littlefield & Adams, 1987), a 28-item, Likert scale questionnaire, provided at posttest, it was determined that sense of participation and satisfaction were nearly identical between the CP and traditional treatment groups ($p < .07$). However, this may have been biased by the lack of randomization in group assignment (Baldwin).

Ickovics and coauthors (2007), in the study discussed previously, measured satisfaction with prenatal care using a modified Patient Participation and Satisfaction Questionnaire (Littlefield & Adams, 1987) administered in the third trimester of pregnancy using computer-assisted self interviewing. Statistically significant differences were observed ($F = 27.16$, $p < .001$) in favor of CP. The average traditional care score was 4.9 points lower than the mean score for CP (Ickovics et al.).

Robertson et al. (2008) also using the Patient Participation and Satisfaction Questionnaire (Littlefield & Adams, 1987) assessed satisfaction using a paper and pencil survey translated into Spanish. The researchers administered the survey postpartum. The authors, contrary to Ickovics et al. (2007), were unable to detect a difference between the CP and traditional care groups (Robertson et al.).

Baldwin (2006) assessed health locus of control with Labs and Wurtele's Fetal Health Locus of Control instrument (Labs & Wurtele, 1984) to assess the perceived control of the health of her unborn child. The degree to which women agree that they (internal locus of control), other (powerful others), and chance control their unborn child's health. After data analysis it was determined that there were no difference between fetal locus of control between women receiving traditional or CP prenatal care. However, the CP group's mean scores in the "chance" subscale improved from pre- to posttest more than the comparison group. This may be explained by the greater education included in CP groups that lead to better understanding of how poor health outcomes develop (Baldwin).

Within the same study discussed above, Ickovics et al. (2007) measured prenatal distress using the Pregnancy Distress Questionnaire (Lobel, 1996) as a whole and two subscales to measure readiness for labor and delivery and readiness for infant care. The survey was administered in the third trimester of pregnancy using computer assisted self interviewing. Results for prenatal distress and readiness for infant care indicated no significant differences between groups, but women in CP did score significantly higher on the readiness for labor and delivery subscale ($F = 12.77$, $p < .001$) (Ickovics et al.).

Robertson et al. (2008) additionally assessed the effect of CP on self-esteem. Measurements were taken at initial contact (24-26 weeks gestation) and postpartum using the Rosenberg Self-Esteem Scale (Rosenberg, 1965). Only 13 participants completed the survey at both time points limiting the power even more. It was determined that Centering pregnancy does not significantly improve self-esteem (Robertson et al.)

Baldwin (2006) studied perceived social support received from the woman's midwife, significant other, and other pregnant women using Brown's Support Behaviors Inventory (Brown, 1986). No statistically significant differences were found between the CP and traditional care groups (Baldwin).

The differences in health behaviors during pregnancy between CP and traditional prenatal care have been investigated. The behaviors studied include; breastfeeding, attendance of recommended prenatal care, attendance of eight-week postpartum well-women checkup, pediatric care for the infant, and overall health behaviors.

Grady and Bloom (2004) in a poorly designed study compared pregnant adolescents receiving care under the CP model at an age-specific public clinic to two

other groups of women. The first comparison group in this study came from archival data with pregnant adolescents who received prenatal care at the same clinic before the CP model was introduced and the second group included a sample of all women of all ages who delivered at Barnes Jewish hospital during the same 2001-2003 period. Women in this group received typical prenatal care. The CP group's prenatal care attendance rates were statistically significantly higher ($p < .02$) with an average of 11.5 visits during pregnancy and a 19% no show rate. The no-show rate for the adult women group was 28%. No information for the 1998 comparison group was collected. This comparison is weak due to the age differences between the samples (Grady & Bloom).

Ickovics and coauthors (2007) also measured adequacy of prenatal care. Using methods discussed above and chart abstraction to collect data. Using Kotelchucks Index (Kotelchuck, 1994) adequacy of prenatal care measure it was determined that those in CP were less likely to receive inadequate care ($\chi^2 = 6.49$, $p < .01$) (Ickovics et al.).

Ickovics and others (2007) measured breastfeeding at 6 months postpartum using a self report survey. A significantly larger percent of women that received CP prenatal care (66.5%) than those assigned to traditional care (54.6%) reported breastfeeding initiation ($\chi^2 = 12.5$, $p < .001$) (Ickovics et al.).

Robertson and coauthors (2008) in the study described above measured breastfeeding using the Breastfeeding Behavior Scale (Ickovics, 2003c). The survey was administered at the postpartum visit and determined that there was not a significant difference between breastfeeding rates among the groups (Robertson et al.)

In the same study, Roberston and colleagues (2008) assessed health behaviors using the Pregnancy Related Health Behavior Scale (Ickovicks, 2003a). This14 item instrument seeks to determine how often the participant has engaged in health behaviors in the two-weeks prior to survey administration. The measured behaviors include exercise, sleep, eating breakfast, taking vitamins and water intake. The final scores can range from 0-56. Additionally, two items, though not included in the final score, were added by the authors to assess changes in eating healthy and exercising. The instrument was administered at 34-36 weeks gestation. Again there was not a significant difference between CP and traditional prenatal care. Mean scores for the traditional and CP groups were 36.2 and 34.8, respectively (Robertson et al.)

Birth outcomes between women in traditional and CP prenatal care have also been studied. The outcomes which have been researched are; birth weight, occurrence of low birth weight, gestational age at delivery, occurrence of preterm delivery, cesarean section delivery, incidence of small for gestational age, and fetal demise.

Grady and Bloom (2004) using the methods described previously audited the medical charts of the CP and control groups and found no statistically significant decrease in cesarean delivery in the CP group. However, the authors found that low birth weight (less than 2500 grams) ($p < .02$) and preterm birth ($p < .02$) were statistically significantly less prevalent in the CP group when compared to both the teen comparison group and the Barnes Jewish hospital group (Grady & Bloom).

Similar results were observed by Ickovics and coauthors (2007). Within the study described above, researchers dichotomized age of delivery into term and preterm (before

37 weeks gestation) for the analysis. Using a χ^2 analysis a significantly lower number of preterm births occurred in the CP (9.8%) than in traditional care (13.8%) ($\chi^2 = 4.01$, $p = .045$). With and odds ratio of .67 (95% CI 0.44 -0.99), the researchers observed a 33% reduced risk of preterm birth. The authors pointed out this reduction would lead to a decreased incidence of 40 per 1,000 births. Further analysis was conducted using Cox proportional hazards and determined, after controlling for race, age, prenatal distress, history of preterm birth, smoking, and previous miscarriage or still birth, that differences between CP and traditional study participants on risk of preterm birth were first presented itself at 26 weeks gestation and continued up until the 35th week of pregnancy ($\chi^2 = 3.79$, $p = .048$). The positive effect of decreased risk of preterm birth was even higher for African Americans in CP ($\chi^2 = 5.22$, $p = .02$; OR 0.59, 95% CI 0.38-0.92) Analysis of gestational age did not lead the researchers to conclude CP influenced gestational age at delivery (Ickovics et al.).

Ickovicks (2003c) used a matched cohort design of women who chose CP ($n = 229$) or traditional ($n = 229$) prenatal care. Participants were matched on the variables: clinic where prenatal care was delivered, age, race/ethnicity, and parity. Using this sampling design it was found that birth weight was statistically significantly greater for infants born to mothers in the CP group ($F = 7.68$, $p < .01$). Furthermore, of the preterm infants, birth weight was significantly higher for the CP group ($F = 5.66$, $p < .01$). This difference cannot be attributed to the incidence of preterm birth as they were found to be the same. However, post hoc analysis uncovered that CP women maintained pregnancy

two weeks longer than those in the traditional care group ($p < .001$). The authors concluded that later delivery dates increased the birth weight in the CP group.

Ickovics and others (2007) did not observe significant differences on birth weight, incidence of low birth weight (dichotomized), or incidence of delivery of small for gestational age infants. A dose-response effect was observed for the CP group on the variables gestational age ($r = 0.14$, $p = .003$) and birth weight($r = .13$, $p = .003$) even after adjusting for number of eligible visits. After trichotomizing the number of eligible visits attended into less than 33%, 33-66%, and more than 66% mean gestational age at delivery increased from 37.9 to 39.0 and 39.2 years, respectively. Birth weights increased from 2,874.3 to 3,103.2 and 3,181.6 g., respectively (Ickovics et al.).

Ickovics et al. (2007) also examined 5-min Apgar scores and the percent of infants admitted to a NICU after delivery. No significant differences were observed on these outcomes (Ickovics et al.).

Though this body of literature is small it has been found that women who receive CP prenatal care are more likely to attend more prenatal care visits, have better knowledge of pregnancy scores, have lower “chance” subscale scores on a locus of control measure, feel more ready for labor and delivery, and feel more satisfied with prenatal care. Birth outcomes where favorable differences have been observed include a likelihood to deliver higher birth weight infants and maintain pregnancy two weeks longer as well as a decreased likelihood to deliver a preterm infant. Furthermore, African-American women participating in CP have a more pronounced reduction in risk of preterm birth.

Summary

In the previous discussion the history, objectives, implementation, and outcomes of traditional prenatal care have been reviewed. Regarding CP the limited existing research was reviewed. The next section will discuss the methods of the current study.

CHAPTER 3

METHODS

This chapter will provide an overview of the procedures used for the current study. The research design, sampling procedures, data collection and instrumentation will be discussed. Information regarding Institutional Review Board approval and statistical analysis will also be provided.

Design

The proposed study used a correlational, cross-sectional, two-group design to compare the health practices of pregnant women in CP and traditional prenatal care and add to the growing body of literature concerning CP and thereby guide clinicians regarding the type and content of the prenatal care they provide. Data were obtained using paper and pencil surveys with a convenience sample of women either enrolled in traditional or CP prenatal care.

Sample

Selection Criteria and Group Assignment

Consistent with previous research in this area, participants in the study were women age 18 years and older who were between 28-42 weeks gestation and attended their first prenatal care visit before 12 weeks gestation. A convenience sample of participants was recruited from The Women's Health Center in Madisonville, Kentucky

May 12- June 5, 2008. The Women's Center is a multiple care provider Obstetrics and Gynecology clinic that operates within the Trover Health System. Both physicians and Certified Nurse Midwives provide care at this clinic. According to LeAnn Todd, the clinic director, the clinic serves women with both private and publicly provided insurance with 68% of obstetrics patients care being paid for by Kentucky. This is higher than the average Medicaid covered live deliveries in Kentucky of 38.4% (March of Dimes, 2006). Women seeking prenatal care in this clinic have the choice of receiving care from physicians or Certified Nurse Midwives. Women with Medicaid funded care are usually treated by Certified Nurse Midwives due to the decreased cost associated with pregnancies and births managed by Certified Nurse Midwives. All prenatal patients receiving care from Certified Nurse Midwives are encouraged to participate in CP. Those who decline CP are, according to LeAnn Todd often those women who are either less compliant with care or are unable to attend due to scheduling constraints. In some cases the physicians will recommend CP care to their patients.

Sample Size

In order to determine adequate sample size for the present study, a power analysis was performed using G*Power software (Erdfelder, Faul, & Buchner, 1996). For the multiple regression analysis, using four predictor variables (income, race-ethnicity, parity, and prenatal care type), an alpha of .05, effect size of 0.10, and expected power of 80% a sample size of 125 was determined to be adequate to detect a significant difference if one exists.

Using the program Study Size 2.0 an additional power analysis was computed for the Wilcoxon Sum Rank Test. With five possible response categories and assuming an odds ratio of .4, an alpha of .05, a power of 80%, and equal dispersion of responses in each category in the control group it was determined that the samples in the traditional and CP should include at least 118 participants being split as equally as possible between the two groups.

A total of 125 surveys were administered during data collection. Among the administered surveys, 50 came from CP participants and 75 came from traditional prenatal care participants. All surveys were completed in entirety and therefore retained for analysis. Seven participants reported entering prenatal care after the first trimester. All participants were prescreened using medical records to determine gestational criteria of age, gestational age, and commencement of prenatal care before the 12^{th} week of pregnancy. It is not clear why the participant's responses did not match their medical records. Because medical charts were used for screening and survey only for health behavior index scoring these surveys were retained in the data analysis. Notably, due to time restraints and difficulties logistically fewer surveys were collected from the CP group than the Wilcoxon Sum Rank Test power analysis suggested though the overall number of surveys suggested was met. Despite the lower number of CP surveys the assumptions of the analysis was met. Using a post hoc power analysis to determine the amount of decreased power for the Wilcoxon Sum Rank Test, a difference of .03 from .80 to .77 was observed. Because the overall sample size for the multiple linear regression analysis was met, the imbalance in group sample size did not necessarily

decrease power. The imbalance in group size, however, increased the likelihood of violating some of the assumptions of the analysis. These assumptions, including outliers, influential data, normality, homoscedasticity, collinearity, nonlinearity, and autocorrelation, were assessed, and due to the robustness of the analytical method none were violated at an alpha of .05.

Sample Demographics

Data collected on parity, or number of previous live deliveries shows that the sample mean was 1.008 (*SD* = 1.11). Parity ranged from 0-5. The annual income of sample ranged from less than $10,000 to more than $90,000. The sample reported a median income of $20,000-30,000. Race/Ethnicity data showed that the majority of the participants were white (*n* = 110, 88.8%) followed by Black (*n* = 13, 10.4%) and Hispanic (*n* = 1, .8%). No participants reported being American Indian, Asian, or Native Hawaiian or Other Pacific Islander. Using a chi-square test, no differences between CP and traditional prenatal care on race were detected. Additionally, those in traditional prenatal care reported a statistically significant (*t* = 3.62, *df* = 117.46, *p* <. 001) higher income (*M* = 4.21) than those in CP (*M* = 2.625) using Wilcoxons Sum Rank Test. Using the same test, there was not a significant difference in parity between the two groups. Further information on race/ethnicity, income, parity, and prenatal care type is shown in Table 1.

Table 1

Participants' Demographic Characteristics

Demographic	Group	Valid *N* (%)	Traditional (%)	CP (%)
Parity	0	51(40.8)	27(36.0)	24(48)
	1	41(32.8)	25(33.33)	16(32)
	2	19(15.2)	15(20.0)	4(8)
	3	10(8.0)	5(6.67)	5(10)
	4	3(2.4)	2(2.67)	1(2)
	5	1(0.8)	1(1.33)	0
Income*	Less than 10 K	34(28.09)	12(16.43)	22(45.83)
	10 K-20 K	20(16.53)	15(20.55)	5(10.42)
	20 K-30 K	16(13.22)	8(10.96)	8(16.67)
	30 K-40 K	12(9.91)	8(10.96)	4(8.33)
	40 K-50 K	10(8.26)	6(8.22)	4(8.33)
	50 K-60 K	12(9.92)	9(12.33)	3(6.25)
	60 K-70 K	6(4.95)	6(8.22)	0
	70 K-80 K	4(3.30)	2(2.74)	2(4.17)
	80 K-90 K	3(2.48)	3(4.11)	0
	More than 90 K	4(3.31)	4(5.48)	0
Race/Ethnicity	White	110	64	46
	Black	13	9	4
	Hispanic	1	1	0
	Native Hawaiian or Pacific Islander	0	0	0
	Asian	0	0	0
	American Indian	0	0	0

Note: $n = 125$

* Significant difference between CP and traditional care, $t = 3.62$, $df = 117.46$, $p < .001$

Instrumentation

The instrument used for this study includes items that address demographics, perceptions of prenatal care, behavior change and Lindgren's (2005) Health Practices Questionnaire-II (HPQ-II) (see Appendix A). The HPQ-II is a 34 item self-administered questionnaire designed to measure health practices during pregnancy was selected as the instrument for data collection. The purpose of the HPQ-II is to measure the degree to which a pregnant woman:

1. balances rest and exercise
2. takes recommended measures to prevent illness and injury
3. implements recommended guidelines for nutritional/dietary intake
4. avoids use of substances that may be harmful during pregnancy
5. obtains healthcare
6. obtains information and gains knowledge about pregnancy and childbirth

Each of the 34 items are answered on a 5-point Likert scale ranging from never to always, frequently, or daily as the given behavior is suggested as an appropriate amount to which one should engage in the behavior. Eleven of the items are negatively worded necessitating reverse coding for study survey items 9-12, 16, 18, and 25-29, after which high scores indicate healthier behaviors. Each of the questionnaire items can stand alone in statistical analysis or, after reverse coding the appropriate items; the responses can be summed to yield an index score that reflects the overall health practices of the subject. The index score can range from 34 - 170. A higher index score represents a more beneficial or healthy frequency of behaviors.

This instrument was selected because it has established content validity and internal consistency (Lindgren, 2003). Content validity was established by using the Content Validity Index (CVI) process with eight experts including certified nurse midwives and educators holding either masters or PhDs. After instructing the panel on the six goals for the HPQ-II, they were asked to match each survey item with one or more of the goals. Eighty-eight to 100% agreement was obtained for this step. Afterward the panel was asked to rank items according to relevance. Using these responses the CVI score was found to equal .83, with a CVI of .80 or greater indicating content validity. Using a sample of ten pregnant women, content validity was again established. The sample was asked to match the survey items with the six initial goals. The panel agreed 90-100% of the time. Finally, the survey was administered to 312 pregnant women enrolled in nurse midwifery or physician administered prenatal care. To establish reliability and construct validity the sample completed the HPQ-II and three other surveys. The first being the Health-Promoting Lifestyle Profile-II (Walker, Sechrist, & Pender, 1987) a 52-item, four-response Likert scale questionnaire designed to measure health-promoting behavior. The Healthy Habits questionnaire (Belloc & Breslow, 1972) designed to measure health habits that might affect physical health status by using eight items with response options ranging from two to four was used. The final questionnaire administered was the Attitudes to Pregnancy and the Baby a 12-item subscale of the Maternal Adjustment and Maternal Attitudes Questionnaire (Kumar, Robson, & Smith, 1984). Results included an alpha coefficient of .81, indicating high internal consistency. To ensure items were not repetitive, item-to-total correlations were calculated and

usually ranged from .20 to .51, indicative of low item redundancy. Items with low item-to-total correlations were retained however to maintain construct validity. Comparing HPQ-II scores to demographic data, higher scores were found to correlate with maternal age, education, income, parity, and partner status. Additionally, the HPQ-II was found to be correlated with health practices before pregnancy, attitudes to pregnancy and the baby, and four of the seven items on the Healthy Habits questionnaire.

Two additional items, 38 and 39, were added to the survey. The first additional item is designed to measure the perceived value of prenatal care for each study participant. Using a five point Likert scale response the item asks, "How important has your prenatal care been during your pregnancy?" A higher score indicates a higher perceived value. The second item is designed to measure what behaviors women have changed during pregnancy by asking "Which of the behaviors have you adopted during your pregnancy? Check all the behaviors you have changed during your pregnancy." The participants answer by selecting any or all of the 22 provided responses. This list of possible responses was drawn from the behaviors measured in the HPQ-II. This item is scored by counting the number of reported behaviors that were changed and using that number as the score. It is not expected that women will need to change all 22 behaviors, although a higher score is indicative of the woman adjusting their life to ensure a healthier pregnancy.

Data Collection

Approval was first obtained from the Institutional Review Boards (IRB) at Utah State University (see Appendix B) and Trover Health System (see Appendix C) which operates the Women's Health Center. The Trover IRB determined that the study was exempt from further IRB regulations as no personal identifiers were collected and surveys were the only means for data collection. The IRB at Utah State University waived the need for an informed consent due to the minimal risk the study presented and because no personal identifiers were collected.

All research participants were prescreened by the student researcher using the study's exclusion criteria using medical charts. Recruitment procedures varied depending on type of prenatal care type. Traditional care participants were approached in the clinic waiting room or, in a few cases, after being taken to their exam room before their physician began providing care. CP participants were approached at the beginning of their CP group while self and clinical assessments were being performed. It should be noted that the environments in which participants filled out their surveys differed between groups. Those in CP may have felt more comfortable reporting less desirable behaviors due to the open culture implementers of CP seek to create.

Participants were given the option of entering to win one of six $20 Wal-Mart gift cards as compensatory prizes. After data collection six participants were drawn at random to receive the prizes. Each winner was contacted by phone and given the option of receiving the card by mail or to pick the card up at the Women's Health Center.

All participants were verbally invited to participate, and women who expressed interest in participating were provided (a) a letter of information (Appendix D) according to Utah State University Institutional Review Board (IRB) procedures, (b) a survey (Appendix A), and (c) a prize entry card. The participants completed the survey and prize entry card and returned them to two separate locked drop boxes located in the waiting room or in the CP group room. Data were recorded in an Excel database for statistical analysis and saved on a password protected computer.

Statistical Analysis

Each participant's responses were recorded in an Excel file for analysis in R, a statistical software program (R Development Core Team, 2008). Descriptive statistics and two different inferential analyses, multiple regression for the continuous data and the Wilcoxon Rank Sum test and chi-square test for the nominal data, were utilized in this study to determine if the health behaviors of pregnant women differ based on their participation in the two types of prenatal care (see Table 2). Although initially the researcher sought to use a regression analysis for the nominal data, both logistic and nonparametric regressions were ruled as they were not appropriate for the data as evidenced by violated assumptions.

Responses to items 5 - 37 (Appendix A) were used to compute the index health score. Dummy coding was used for the nominal predictors, race and prenatal care type, while income and parity were mean centered. Because the sample included only a small

Table 2

Research Questions, Survey Items, and Statistical Methods

Research Question	Item Number	Statistical Method
In comparison to women receiving traditional prenatal care, do women receiving care under the CP model score better on an index pregnancy health behavior scale?	5-37	Multiple Linear Regression
In comparison to women receiving traditional prenatal care, are women receiving care under the CP model more likely to seek to gain a recommended amount of weight?	34	Wilcoxon Rank Sum Test
In comparison to women receiving traditional prenatal care, are women receiving care under the CP model less likely to smoke cigarettes during pregnancy?	25	Wilcoxon Rank Sum Test
In comparison to women receiving traditional prenatal care, do women receiving care under the CP model value their prenatal care experience more?	38	Multiple Linear Regression
In comparison to women receiving traditional prenatal care, do women receiving care under the CP model report changing more behaviors?	39	Wilcoxon Rank Sum Test

number of participants who reported a race/ethnicity other than white, the variable was collapsed into two categories for analysis: White and non-White.

Summary

In this chapter, the methodology of the study was discussed. Specifically, the research design, sampling procedures, sample size determination, data collection, instrumentation, and statistical analysis used in this study were reviewed in this chapter.

CHAPTER 4

RESULTS

A study was conducted to determine if CP prenatal care influenced health behavior during pregnancy. This chapter discusses the results of the five research questions posed in chapters one and three. The results are presented below.

Research Question 1:

In comparison to women receiving traditional prenatal care, do women receiving care under the CP model score better on an index pregnancy health behavior scale?

In order to answer this question participants completed HPQ II items on the study survey. Participants were asked to report how often they engage in certain behaviors. Participant responses to HPQ II items were scored and summary data were calculated (see Table 3). Higher scores indicate healthier behaviors. After computing the general health practices index score, the index scores were used as the dependent variable in the regression model. Control variables were income, parity, and race. The dependent variable was prenatal care type.

A standard multiple linear regression was performed. After evaluating the assumptions of the analysis, all of the input variables were retained without transformation. Table 3 displays the results of the full regression analysis. In the full model significant differences were observed between the control variables race/ethnicity (p = .016) with White (M = 9.90, SD = 6.345) and non-White participants (M = 5.642, SD

Table 3

Model Summary for Health Behavior Index Score

Variable	Estimate	*SE*	*t*-value	*p*-value
Intercept	130.86	1.48	88.51	< 0.0000
Race (non-white)	-8.18	3.34	-2.45	0.01
Income	1.00	.44	2.26	0.02
Parity	-.02	0.03	-0.76	0.44
Prenatal Care (Centering)	-5.87	2.30	-2.55	0.01

= 3.248) and income (p = .025). After controlling for race index scores increased one point for every 10,000 increase in income. Due to its role as a control variable parity was retained in the final model despite its failure to achieve significance. An incremental F-test was employed to determine if removal of parity would alter the omnibus indices of model fit (p = .440). The results of this test showed no significant decrease in model fit with parity excluded from the model. The independent variable, prenatal care type was also a significant predictor (p = .010). In regards to type of prenatal care when race is white and income and parity are held at their means individuals in CP have index health behavior scores 5.87 points lower (M = 123.66, SD = 10.446) than those in traditional prenatal care (M = 129.52, SD = 12.313). The overall model shows that the predictor variables account for 16% of the variance (R^2 = .164. and R^2_{adj} value = .131) in the index health behavior scores, $F(4,116) = 5.524$, $p < .001$. Using rules of thumb for the R^2 (Cohen, 1988) it is noteworthy that the final model predictors have a medium sized effect on the outcome.

Table 4

Descriptive Statistics of Reported Behaviors

	Centering Pregnancy			Traditional		
	M	*SD*	*n*	*M*	*SD*	*N*
5. Healthy Lifestyle	3.760	.743	50	3.907	.873	75
6. Eight hours of sleep per night	3.320	1.096	50	3.387	1.096	75
7. Exercise 3 + times per week	2.780	1.217	50	2.627	1.050	75
8. Use a seatbelt	4.14	1.030	50	4.28	1.097	75
9. Drink more than 2 caffeinated beverages per day	2.800	1.069	50	3.147	1.238	75
10. Use marijuana	4.860	.700	50	4.907	.373	75
11. Use other illegal drugs	5.0	0	50	4.933	.577	75
12. Engage in Risky sexual practices*	4.240	1.238	50	4.733	.777	75
13. Report concerns to prenatal care provider*	3.860	.881	50	4.413	.737	75
14. Ask questions to prenatal care provider*	4.08	.829	50	4.48	.704	75
15. Discuss medication/ supplement use with prenatal care provider*	3.740	1.006	50	4.293	.866	75
16. Use un recommended herbs*	4.74	.694	50	4.92	.427	75
17. Read food labels	2.640	1.156	50	3.387	1.195	75
18. Douche	4.380	1.066	50	4.533	.949	75
19. Avoid excessively hot baths*	3.00	1.178	50	3.733	1.189	75

20. Avoid exposure to dangerous substances*	4.30	1.164	50	4.76	.589	75
21. Take recommended vitamins	4.040	4.107	50	4.107	1.21	75
22. Consume adequate amounts of calcium	3.620	1.105	50	3.907	1.016	75
23. Consume at least five fruits/vegetables a day	3.32	1.096	50	3.56	1.017	75
24. Consume adequate amounts of fiber *	3.120	.940	50	3.533	.963	75
25. Smoke cigarettes	3.920	1.652	50	4.013	1.511	75
26. Consume Alcohol (frequency)	4.560	1.248	50	4.413	.692	75
27. Consume Alcohol (quantity)	4.440	1.296	50	4.427	1.416	75
28. Gestational age when prenatal care began	3.60	1.125	50	3.68	1.129	75
29. Miss prenatal care appointments*	4.400	.756	50	4.267	.881	75
30. Receive regular dental care	3.300	.953	50	3.453	1.233	75
31. Learn about pregnancy/birth	3.260	.828	50	2.827	1.267	75
32. Discuss pregnancy/birth with others*	3.70	0.735	50	3.96	1.108	75
33. Engage in relaxing activities*	3.00	.495	50	3.28	1.047	75
34. Seek to gain an appropriate amount of weight	3.240	1.135	50	3.547	1.277	75
35. Consume adequate amounts of water	3.760	1.041	50	3.707	1.124	75
36. Avoid risks of toxoplasmosis	3.660	1.573	50	3.787	1.780	75

37. Attend a childbirth class**	3.080	1.397	50	1.853	1.332	75

*Significant (p = 0.05, two tailed) differences between CP and traditional groups, traditional group higher
**Significant (p = 0.05, two tailed) differences between CP and traditional groups, CP group higher

An item analysis was completed and found the traditional group obtained significantly higher (more beneficial) scores regarding the frequency that they reported their concerns to a prenatal care provider, avoided exposure to dangerous substances, discussed their pregnancy with others, discussed medication and supplements with a physician, consumed adequate amounts of fiber, avoided unrecommended herbs, avoided excessively hot baths, asked more questions to their care provider, engaged in relaxing activities and avoided risky sexual practices than those in the CP group. Conversely, those in CP group obtained significantly higher (more beneficial) scores regarding the frequency that they missed prenatal appointments and attended birth classes than those in the traditional care group. Results are noted in Table 4.

Research Question 2:

In comparison to women receiving traditional prenatal care, are women receiving care under the CP model more likely to gain a recommended amount of weight?

To answer this question a two-tailed Wilcoxon Rank Sum test was used. With seeking to gain weight as the dependent variable (item 34) and prenatal care type as the independent variable, the analysis lead the researcher to fail to reject the null hypothesis (W = 2190.5, p = .090). The mean for the CP group was less favorable (M = 3.240, SD = 1.135) than the traditional group (M = 3.547, SD = 1.277).

Research Question 3:

In comparison to women receiving traditional prenatal care, are women receiving care under the CP model more likely to refrain from smoking?

Again, a two-tailed Wilcoxon Rank Sum test was used to determine the relationship between prenatal care type and smoking during pregnancy (item 25). No difference between the two groups, CP (M = 3.920, SD = 1.652) and traditional prenatal care (M = 4.013, SD = 1.511) was observed (W = 1901, p = .87). After collapsing the smoking into rates rather than frequencies it was observed that, among women in CP 33 did not smoke during pregnancy while 16 did. Rates in the traditional group are 49 non-smoking and 25 smoking.

Research Question 4:

In comparison to women receiving traditional prenatal care, do women receiving care under the CP model value their prenatal care experience more?

Using the Wilcoxon Rank Sum test a significant difference of perceived value of prenatal care (item 38) between the participants in CP and traditional prenatal care (W = 2270, p = .007). Furthermore, it was shown that those in traditional prenatal care reported valuing their prenatal care more (M = 4.589, SD = .796) than those in CP (M = 4.280, SD = .904).

Research Question 5:

In comparison to women receiving traditional prenatal care, do women receiving care under the CP model report changing more behaviors?

Values for the outcome variable were obtained by survey item 39 which requests women indicate whether they altered certain health behaviors during pregnancy. The number of behaviors that the participant marks as changed are counted to yield the study subjects score. A multiple linear regression was used to answer this research question. Control variables were again income, parity, and race. The dependent variable was again prenatal care type. Analyses were completed to ensure assumptions of the analysis were met.

Table 5 displays the results of the full regression analysis. In the full model significant differences were observed between White and non-White participants (p = .014) and parity (p = .011). Income and prenatal care type were not predictive of the number of behaviors reported changed during pregnancy. The overall model shows that the predictor variables account for 11.9% of the variance in the number of behaviors reported changed during pregnancy, R^2 = .119 and R^2_{adj} =.089, F (4,115) = 3.931, p = .0049. The predictor variables have a small effect size on the outcomes variable (Cohen, 1988). No difference was observed between CP (M = 10.26, SD = 6.356) and traditional prenatal care (M = 9.00, SD = 6.123) in regards to the number of behaviors reported changed during pregnancy. Table 6 reports the percent of groups that reported

Table 5

Percent of group reporting changed behaviors

	Traditional	CP
Eight hours of sleep per night	48	54
Exercise 3 + times per week	41.33	34
Use a seatbelt	54.67	52
Drink more than 2 caffeinated beverages per day	50.67	50
Use marijuana	24	44
Use other illegal drugs	38.67	42
Engage in Risky sexual practices	18.67	40
Use un recommended herbs	45.33	38
Read food labels	36	30
Douche	36	46
Avoid excessively hot baths	36	42
Avoid exposure to dangerous substances	32	58
Take recommended vitamins	30.67	68
Consume adequate amounts of calcium	32	44
Consume at least five fruits/vegetables a day	41.33	40
Consume adequate amounts of fiber	42.67	28
Smoke cigarettes	30.67	46
Consume alcohol	48	58
Receive regular dental care	34.67	40
Engage in relaxing activities	69.33	48
Seek to gain an appropriate amount of weight	52	56
Consume adequate amounts of water	50.67	68

changing specific behaviors. An item analysis was conducted to determine if any differences existed between the two treatment groups on each specific behavior. There were no significant differences.

This section outlined the study results by for each research question. The next section will provide a discussion of each of the results in relation to other research with conclusions and suggestions for future research.

Table 6

Model Summary for Behaviors Changed

Variable	Estimate	SE	t-value	p-value
Intercept	9.719	0.737	13.186	<.00000
Race (non-White)	-4.015	1.667	-2.409	0.017
Income	-0.226	0.220	-1.009	0.314
Parity	-1.292	0.480	-2.688	0.008
Prenatal Care (Centering)	0.335	1.149	0.292	0.771

CHAPTER 5

DISCUSSION

This study of prenatal care behaviors among women in CP and traditional prenatal care was designed to expand upon earlier knowledge about CP. Despite previous research that had found CP to improve birth outcomes, only one study, conducted by Roberston et al. (2008), has compared general health practices of CP and traditional prenatal care patients.

General Health Practices

The present study found that participants from the CP group did not score higher on the health behavior index. In fact participants from the CP group scored lower on the health behavior index with this sample. When income and parity are held at their mean and among the reference group (white) those in CP score nearly six points lower than those in the traditional care group. While a previous study did not observe a significant difference between the CP and traditional groups due to limited sample size, the CP groups mean health behavior score was lower than the traditional group (Robertson et al., 2008).

The findings of the present study are not consistent with the findings of Vonderheid and colleagues (2007) who concluded that positive health practices were statistically significantly related to health promotion in prenatal care and participation in a midwifery group (see Table 7).

Table 7

Research Question and Findings Compared to Previous Research

Research question	Results of the study	Previous research
In comparison to women receiving traditional prenatal care, do women receiving care under the CP model score better on an index pregnancy health behavior scale?	Women receiving care in CP had lower index health behavior scores.	Agree: Robertson et al., 2008 Disagree: Vonderheid et al. 2007; Grady and Bloom, 2004
In comparison to women receiving traditional prenatal care, are women receiving care under the CP model more likely to gain a recommended amount of weight?	There was not a significant difference between CP and traditional care participants on seeking to gain weight.	Disagree: Alexander & Kotelchuck, 2001; Cogswell et al., 1994; Olson & Strawderman, 2003; Walker et al., 1999
In comparison to women receiving traditional prenatal care, are women receiving care under the CP model less likely to smoke cigarettes during pregnancy?	The current study found no difference in smoking between the two research groups	
In comparison to women receiving traditional prenatal care, do women receiving care under the CP model value their prenatal care experience more?	The current study found a significant decrease in perceived value of prenatal care among the CP group.	Agree: Robertson et al., 2008 Disagree: Baldwin, 2006 and Ickovicks et al., 2007
In comparison to women receiving traditional prenatal care, do women receiving care under the CP model report changing more behaviors?	The current study found no significant differences between study groups on number of behaviors changed.	

In the results of the item analysis it is noteworthy that the differences in the health behavior index scores are likely due to, among other behaviors, decreased discussion of concerns and medication use with their care provider, discussion of pregnancy and birth with others, and frequency of asking questions during prenatal care. These findings could be explained by the nature of the CP model. One-on-one time during prenatal care with CP is minimal, thereby reducing the time to ask questions directly or report concerns. After this brief one-on-one interaction the remainder of the activities in the prenatal care appointment is dedicated to education and discussion with the care provider(s) and peers of similar gestational age. These activities may decrease the need to ask care providers questions and discuss pregnancy and birth because of the strong educational and social support components in CP.

As noted before, participants in this study placed themselves in traditional or CP prenatal care thus allowing for selection bias to confound the results. The possible skewing effects are made even more likely by the fact that women with low risk and Medicaid covered pregnancies are more likely to receive CP. This bias in group assignment may have made CP and traditional groups so different in initial knowledge, attitudes, or beliefs masking any effects CP may have. Importantly, the analysis did control for income. However other variables related to socioeconomic status may have suppressed the influence of CP. Examples of possible confounding variables not controlled by this study include attitude toward pregnancy, substance use pre-pregnancy, age, number of prenatal care visits (Vonderheid et al., 2007), social support, depressive

symptoms, fetal-health locus of control, body image, and educational attainment (Walker et al., 1999).

Interestingly, previous research conducted by Baldwin (2006) illustrated that women in CP gain more knowledge during prenatal care. This observation taken with the results of the present study illustrating that health behaviors do not improve in CP, introduces an interesting dichotomy. Either the increased knowledge that results from CP is peripheral to the improvements in birth outcomes or increased knowledge acts to lessen the effect of other causes of poor fetal outcome such as stress. However, it should be noted, that with the extensive education that occurs in CP, study participants may simply be more aware of the health behaviors in which they should be engaging and thus more educated critics of their activities. Thus, they may mark lower frequencies of the behaviors on the survey, skewing the results.

In regards to the index score item analysis, one area where previous research on CP disagrees with the current research is attendance of prenatal care appointments. Participants in the current study reported missing more appointments than those in traditional care while Grady and Bloom (2004) previously found that women in CP miss fewer prenatal care appointments.

Weight Gain

In the measure of seeking weight gain present study found no significant difference between CP and traditional care participants. It is important to note that this study only measured self reported behavior related to weight gain. Each woman at the beginning of pregnancy has a different amount of weight to gain. For this reason the

study survey was worded to emphasize behaviors related to *adequate* amount of weight gain. However, accurately reporting of your weight gain behaviors is contingent on understanding what an adequate amount of weight gain is. Additionally, attitudes regarding weight gain may influence how women report their weight gain behaviors.

Previous research has found actual weight gain was predicted by, among other factors, physician advice on weight gain (Alexander & Kotelchuck, 2001; Cogswell et al. 1994; Olson & Strawderman, 2003; Walker et al., 1999). Interestingly women in CP receive an entire session (90 min) of education on nutrition and weight gain. The emphasis is in this session is on the food guide pyramid and portion sizes. This taken into account the results indicate the expanded education is not an efficient use of care time and is not producing its desired effects. Participants in CP are provided with a weight gain chart and weight themselves at the beginning of each session of care. This is done to ensure the women are monitoring their progress during pregnancy. However, when self weighing the independence removes the opportunity for a nurse to provide encouragement about gaining weight. To rectify the lack of ongoing encouragement that may be occurring in CP, reoccurring statements in each care session should reinforce the need for weight gain behaviors.

It should be noted no previous research has correlated seeking to gain adequate weight with actual weight gain however Alexander and Korenbrot (1995) found a relationship between weight gain advice/education in prenatal care and decreased risk of low-birth weight. Future research should be conducted to determine the effect of CP on actual weight gain or nutritional intake.

Smoking

The current study found no difference in smoking between the two research groups. Smoking during pregnancy is more common among women who are white, have lower educational attainment, are younger, and are enrolled in Medicaid (Bailey, 2006; Beck et al., 2002; Haslam & Lawrence, 2000; Phares et al., 2004; Walker et al., 1999). Because a greater proportion of the CP sample had low incomes, and likely lower socioeconomic status, members of this group were inherently more prone to smoking during pregnancy and any amount of education and social support may not have been sufficient to alter smoking behaviors.

Smoking is not specifically included in the curriculum of CP. Smoking cessation counseling has been found to be one of the most effective prenatal care components (Alexander & Korenbrot, 1995). Therefore, it stands to reason that CP should include cessation counseling early in prenatal care.

Value of Prenatal Care

This study observed a statistically significant difference of perceived value of prenatal care between the two types of care. A possible explanation for a lower perceived value among CP participants is that women, when presented with the options for prenatal care (CP or traditional), are so strongly encouraged to participate in CP that they had false expectations for their care and wer therefore disappointed. It seems that nearly any time a person receives a new or different method of service delivery critiques are harsher. Additionally, women in CP may, because of their prenatal care experience, have become more critical consumers of health care and felt their care could be improved. A further

explanation may be that women enrolled in CP felt they were getting the “cheap” or “discount” version of prenatal care or prenatal care for poor women leading to dissatisfaction.

Research in this area is split with Robertson et al. (2008) not finding significant differences in patient sense of participation and satisfaction and Baldwin (2006) and Ickovicks et al. (2007) who determined patient sense of participation and satisfaction between CP and traditional prenatal care was higher for CP patients. However, these studies did not measure the exact same outcomes.

Behavior Change

After controlling for race/ethnicity, income, and parity the multiple regression analysis results indicate that CP does not seem to lead to a larger number of changed behaviors during pregnancy. This is inconsistent with the notion that the increased education and social support provided in CP leads to improved health behaviors. However, Lewallen (2004) noted in a qualitative study that even before receiving prenatal care women often alter many of behaviors measured in the current study. The result is limited however by the cross-sectional design of the study. Women may have changed the frequency of their behaviors during pregnancy and not recalled and indicated the changes on the survey. Furthermore health behaviors, particularly new health behaviors may be practiced at one period of time and then terminated only to be restarted later. A longitudinal research design is better suited to detect differences in behavior change. Additionally, the survey question used for this research question was developed specifically for this study and may not have been an efficient measure of behavior

change. No previous research has measured the number of behaviors actually changed during pregnancy.

Implications for Health Education

This study determined that, among this sample, CP does not seem to lead to improved health behaviors or an increased number of changed behaviors. These findings are important for those that provide CP or traditional prenatal care. With previous research noting the importance and efficacy of health promotion during pregnancy, it is surprising that CP, with its expanded education and social support, does not seem to lead to improved health behaviors. Although behavior change during pregnancy and the lifespan facilitated by education and social support is a goal of CP, alterations to further emphasize improved health behaviors may be important. The model could be improved by an increased emphasis on smoking cessation and weight gain, two of the most efficacious services contained in prenatal care (Lu et al., 2003)

Further content alterations to ensure women feel comfortable asking questions, reporting concerns, and discussing medication and supplement could improve the model. Those that implement CP may feel the placement of women in a group will ensure women are receiving enough support thereby do not need to encourage women to discuss their pregnancy with others outside the group. Though the group can fill some of the needs for support, discussion of a woman's pregnancy with her family and friends should be encouraged.

Additionally, the timing of care could be altered. CP, like traditional care, is heavily back loaded to ensure appropriate assessment of maternal and fetal health and development. Though this late pregnancy monitoring is necessary, an increased frequency or duration of education early in pregnancy may be better timed to facilitate behavior change during pregnancy.

Prenatal care, as it leads women to be more aware of their health, receive more time to interact with health professionals, and have increased incentive to adopt new behaviors, is an ideal time for health educators to assist women in improving their lifelong health behaviors and commitment to health. CP, with the social support, extended time and educational environment it provides, could, if altered, be an appropriate venue for health educators to lead women to improved lifelong health behaviors.

Given the increased incidence of preterm and low-birth weight births in the U.S. (Mathews & MacDorman, 2006), the positive outcomes observed in prior research for those who receive care under CP (Grady & Bloom, 2004; Ickovics et al., 2003, 2007) are of great importance to the field of health education. Despite the fact that previous research has determined that CP is effective, the results of this study indicate that better outcomes are possible if the model more effectively leads to behavior change.

Future Research

The influence of social desirability on self report studies is notable in all studies but may have been stronger in this study due to its design. Those in the CP group filled

out their survey in their group where openness and honestly are strongly encouraged. Meanwhile, the traditional care group completed their surveys in a busy clinic waiting room where they may have felt the need to report socially desirable behaviors rather than their actual behaviors. Future research in this area should ensure surveys are completed in more similar environments.

Furthermore, the survey is not exhaustive of all health behaviors in which pregnant women should engage. Differences in unmeasured health behaviors may exist between the care types. Future studies should look at more and different health behaviors using different instruments. This instrument has not been validated among this sample and may not have accurately measured the behaviors of the study sample.

Additionally, the study used a cross-sectional design to measure, among other variables, behavior change during pregnancy. Using a longitudinal approach would have improved the detection of behavior change and thus the comparison of the types of prenatal care. Furthermore, if a longitudinal study is conducted collection of data at multiple time points could aid in detection of fluctuated behavior changes that likely occur during pregnancy. A study using this design could guide further reevaluation of education timing during pregnancy.

Moreover, the use of a convenience sample rather than a true experimental design with random selection and assignment is a limitation on the present study. In future research it is suggested that random assignment be employed. If this is not possible simply conducting the study where lower income women are not guided toward CP would improve the study.

As previous research has found CP is effective in decreasing rates of poor birth outcomes, future studies should seek to determine how this is accomplished. Are the poor birth outcomes related to health behaviors? These studies should include look at, both qualitatively and quantitatively, social support, community building, and further examination of behavior change as it relates to knowledge, attitudes and beliefs. Research among other populations that include more minorities is also suggested.

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APPENDICES

Appendix A. Study Instrument

Prenatal Behaviors Survey

The survey includes 38 questions and is printed front and back.

1. What type of prenatal care are you receiving?

Typical/ Traditional	Centering Pregnancy/ Group
○	○

2. How many babies have you delivered in the past?

None ○	1 ○	2 ○	3 ○	4 ○	5 ○	6 or more ○

3. What is your race/ethnicity?

American Indian	Asian	Black	Native Hawaiian or Other Pacific Islander	White	Hispanic
○	○	○	○	○	○

4. What is you household's yearly income?

More than $90,000	$80,001 to 90,000	$70,001 to 80,000	$60,001 to 70,000	$50,001 to 60,000
○	○	○	○	○
$40,001 to 50,000	**$30,001 to 40,000**	**$20,001 to 30,000**	**$10,001to 20,000**	**Less than $10,000**
○	○	○	○	○

Below are questions about your behaviors during pregnancy. Report how often you perform that specific behavior using the five options. In this section, please choose only one answer.

5. How often do you practice a healthy lifestyle?

never	almost never	sometimes	almost always	always
○	○	○	○	○

6. How often do you get at least 8 hours of sleep a night?

never	almost never	sometimes	almost daily	daily
○	○	○	○	○

7. How often do you exercise at least 3 times per week?

never	almost never	sometimes	almost always	always
○	○	○	○	○

8. How often do you use a seat belt?

never	almost never	sometimes	almost always	always
○	○	○	○	○

9. How often do you drink more than 2 caffeinated beverages per day?

never	almost never	sometimes	almost daily	daily
○	○	○	○	○

10. How often do you use marijuana?

never	almost never	sometimes	almost daily	daily
○	○	○	○	○

11. How often do you use illegal drugs (other than marijuana)?

never	almost never	sometimes	almost daily	daily
○	○	○	○	○

12. How often do you engage in risky sexual practices (for example unprotected sex or multiple sexual partners)?

never	almost never	sometimes	often	frequently
○	○	○	○	○

13. How often do you report your concerns to your prenatal care provider?

never	almost never	sometimes	almost always	always
○	○	○	○	○

14. When you have questions, how often do you ask your prenatal care provider?

never	almost never	sometimes	almost always	always

○	○	○	○	○

15. When needed, how often do you discuss medication/supplement use with your prenatal care provider?

never	almost never	sometimes	almost always	always
○	○	○	○	○

16. How often do you use herbs that are <u>not</u> recommended?

never	almost never	sometimes	often	frequently
○	○	○	○	○

17. How often do you read food labels?

never	almost never	sometimes	often	frequently
○	○	○	○	○

18. How often do you douche?

never	almost never	sometimes	almost daily	daily
○	○	○	○	○

19. How often do you avoid excessively hot baths?

never	almost never	sometimes	almost always	always
○	○	○	○	○

20. How often do you avoid exposure to dangerous substances?

never	almost never	sometimes	almost always	always
○	○	○	○	○

21. How often do you take <u>recommended</u> vitamins?

never	almost never	sometimes	almost daily	daily
○	○	○	○	○

22. How often do you consume adequate amounts of calcium?

never	almost never	sometimes	almost daily	daily
○	○	○	○	○

23. How often do you consume at least five fruits/ vegetables a day?

never	almost never	sometimes	almost daily	daily
○	○	○	○	○

24. How often do you consume adequate amounts of fiber?

never	almost never	sometimes	almost daily	daily
○	○	○	○	○

25. How often do you smoke cigarettes?

never	almost never	sometimes	daily	multiple times per day
○	○	○	○	○

26. How often do you consume alcohol?

never	almost never	sometimes	almost daily	daily
○	○	○	○	○

27. How much alcohol do you consume, when you drink?

Less than 1 drink	1 drink	2 drinks	3 drinks	More than 3 drinks
○	○	○	○	○

28. How long had you been pregnant when you started prenatal care?

Less than 1 month	1 month	2 months	3 months	More than 3 months
○	○	○	○	○

29. Have often do you miss your prenatal care visits?

never	almost never	sometimes	almost always	Always
○	○	○	○	○

30. How often do you receive regular dental care?

never	almost never	sometimes	almost always	always
○	○	○	○	○

31. How often do you engage in activities to learn about pregnancy/birth?

never	almost never	sometimes	almost always	always
○	○	○	○	○

32. How often do you discuss your pregnancy/birth with others?

never	almost never	sometimes	almost always	always
○	○	○	○	○

33. How often do you engage in relaxing activities?

never	almost never	sometimes	almost always	always
○	○	○	○	○

34. How often do you seek to gain an <u>appropriate</u> amount of weight?

never	almost never	sometimes	almost always	always
○	○	○	○	○

35. How often do you drink adequate amounts of fluid?

never	almost never	sometimes	almost always	always
○	○	○	○	○

36. How often do you avoid the risks of toxoplasmosis?

never	almost never	sometimes	almost always	always
○	○	○	○	○

37. When suggested, how often do you attend a childbirth class?

never	almost never	sometimes	almost always	always
○	○	○	○	○

38. How valuable has your prenatal care been in during your pregnancy?

not at all	slightly valuable	somewhat valuable	valuable	extremely valuable
○	○	○	○	○

39. Which of the behaviors have you adopted during your pregnancy? Check all the behaviors you have changed during your pregnancy.

- ○ Getting at least 8 hours of sleep
- ○ Exercising at least 3 times a week
- ○ Wearing your seatbelt
- ○ Drinking less than 2 caffeinated beverages a day
- ○ Refraining from marijuana use
- ○ Refraining from use of other illegal drugs
- ○ Refraining from risky sexual practices
- ○ Refraining from use of unrecommended herbs
- ○ Reading food labels
- ○ Not douching
- ○ Not taking excessively hot baths
- ○ Avoiding exposure to dangerous substances
- ○ Taking recommended vitamins
- ○ Consuming enough calcium
- ○ Eating at least five fruits or vegetables each day
- ○ Eating enough fiber each day
- ○ Not smoking cigarettes
- ○ Not consuming alcohol
- ○ Receiving needed dental care
- ○ Relaxation/ relaxing activities
- ○ Seeking to gain an appropriate amount of weight
- ○ Drinking adequate amounts of water

Thank You

Please place this survey and your prize drawing entry in the drop-boxes.

Appendix B:
Utah State University Institutional Review Board Letter

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Appendix C:
Trover Health System Institutional Review Board Letter

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Appendix D: Letter of Information

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