

THE CES-D: MEASURING EFFECTIVENESS IN SCREENING FOR  
PRENATAL DEPRESSION

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Whitney Blau, BSN

Submitted to the School of Nursing in partial fulfillment of the  
requirements for the Nursing Honors Program

Faculty Mentor: Ginger Breedlove, PhD, CNM, ARNP, FACNM

University of Kansas School of Nursing

ABSTRACT

Prenatal depression, though less famous than postpartum depression, has serious implications for maternal and fetal outcomes. Estimates suggest that depression affects 7-13% of all adult women in the United States, while, current research estimates that 8-51% of women have experienced depression or depressive symptoms throughout their pregnancy. Depression in pregnancy can lead to complications, decreased compliance with medical advice, and interrupted maternal-fetal bonding. This sub-study, using data from a current, descriptive longitudinal study, seeks to increase understanding about the occurrence of prenatal depression and related maternal behaviors. Data were collected from the population of interest, comprised of 66 publicly or privately insured pregnant women who reside in the greater metropolitan area of a Midwest city. A convenience sample of women, enrolled prior to 21 weeks gestation, was recruited at 4 maternity care offices with assistance of nurse midwives. This sub-study compares prenatal depression results from the Centers for Epidemiologic Studies Depression Scale (CES-D), administered at enrollment and 34 weeks gestation, with results from similar studies conducted in the United States during the last 5 years. The CES-D is a 20 item scale designed to detect depressive symptoms in the general population. A score of 16 or greater is indicative of risk for depression. Results indicated that the percentage of prevalence for risk of prenatal depression, (CES-D score of 16 or greater) was 30.9% at enrollment, and 20.5% at Time 2 (34 weeks gestation) compared with selected studies that indicate prevalence at 20-44%. Participants reported an average age of 25 years, were primarily Caucasian (68%), married (59%), and 25% of participants had attained at least a baccalaureate education, indicating that this study evaluated prenatal depression in an understudied population. Enhanced knowledge about the prevalence of prenatal depression will facilitate discussion and further research in this area. Provider awareness of the incidence and

significance of prenatal depression can improve outcomes by enhancing patient disclosure, facilitating appropriate diagnosis, and initiating early treatment.

## INTRODUCTION

Depression is a problem that approximately 1 in 5 women in the United States will experience during their lifetime (Orr, Blazer, James, & Reiter, 2007) and in one year alone, depression will affect approximately 7-13% of women (Bennett, Einarson, Taddio, Koren, & Einarson, 2004). The childbearing years represent a time of increased vulnerability to the acquisition or recurrence of depression and other psychiatric conditions (Orr et al., 2007; Bennet et al., 2004; Gaynes, Gavin, Meltzer-Brody, Lohr, Sweinson, Garteleher, et al., 2005; Vesga-Lopez, Blanco, Keyes, Olfson, Grant, & Hasin, 2008). While postpartum depression has recently experienced an increase in popularity and media attention, another significant issue for mothers is prenatal depression. Estimates of the incidence of prenatal depression vary widely, suggesting that depression may occur during 8 to 50% of pregnancies (Bennett, et al., 2004). Other estimates suggest that depressive symptoms are reported less frequently, but the most important conclusion that can be drawn from these estimates is that further investigation is needed. Prenatal depression represents a significant health problem for mothers and their infants, poses threats to maternal compliance with important medical recommendations, and may lead to poor maternal-fetal outcomes and continued depression in the postpartum period.

### **Review of the Literature**

#### *Diagnostic Criteria for Depression*

Major Depressive Disorder (MDD), more commonly known as depression, is defined by the American Psychiatric Association (APA) as “a depressed mood or a loss of pleasure in nearly all normal activities for a period of at least two weeks (Lintner & Gray, 2006, p.52),” in combination with the presence of at least four of the following symptoms: 1) alteration in normal appetite or weight, 2) changes in sleep or activity, 3) anergia, 4) thoughts or feelings of worthlessness or guilt,

5) difficulty with decision making, attention, or thinking, or, 6) recurrent thoughts, plans, or attempts at suicide (American Psychological Association [APA], 2000).

### *Diagnosing Depression in Pregnancy*

Perinatal depression shares the same diagnostic criteria as depression that is not related to pregnancy (Lintner & Gray, 2006; Lusskin, Pundiak, & Habib, 2007). The diagnostic criteria established by the Diagnostic and Statistical Manual for Mental Health Disorders (4<sup>th</sup> Edition) allows practitioners to classify depression as postpartum depression if it begins within four weeks of childbirth, however, there is no specific criteria for diagnosing prenatal depression (APA, 2000). The APA does not have specific diagnostic criteria for MDD in pregnancy or Depression in Pregnancy. Depression in pregnancy is associated with the same presentation, symptoms, and course as depression occurring outside the context of pregnancy (Lintner & Gray, 2006).

A descriptive study using the Centers for Epidemiologic Studies Depression assessment scale (CES-D) was conducted by Lindgren in 2001. When scored for prenatal depression, 44.4 % of subjects reported suffering from depression during their pregnancy at some point between their 20<sup>th</sup> and 40<sup>th</sup> week of gestation. Of the single, unmarried women participating in the study, 70% reported scores that met or exceeded the CES-D cutoff score of 16, indicating that they had an increased risk of depression or depressive symptoms.

### *Risk Factors for Prenatal Depression*

Depression in the prenatal period, though diagnostically and symptomatically similar to depression occurring at other times in life has a distinct set of predisposing factors associated with it. Marcus, Flynn, Blow, and Barry (2003) have identified that a history of depression is a major factor in predicting the occurrence of prenatal depression. Women in a study by Marcus, et al. (2003) who reported a history of depression were five times more likely than women without a

prior history of depression, to report a score of 16 or greater on the CES-D, indicating that they had an increased likelihood of experiencing depression or depressive symptoms. Robertson, Grace, Wallington & Stewart (2005) indicate that the strongest risk factors for prenatal depression are: 1) personal or family history of mental health illness, 2) stressful life events during pregnancy, 3) low levels of social support, and, 4) a previous history of postpartum depression.

### *Distinguishing between depression and somatic symptoms of pregnancy*

Typical symptoms of major depression make diagnosis of depression in pregnancy more challenging. "The diagnosis of depression, both in the general population and during pregnancy is most often based on clinical signs and symptoms as reported by the patient (Bennett, et al., 2004, p.699)." Pregnancy is a time of extreme change, hormonal fluctuation, and moderate discomfort. Many of the distinguishing features, used in diagnosing depression, are present in non-depressed expectant mothers (Lintner & Gray, 2006; Westdahl et al., 2007). Women may be unaware, or may underreport, that the symptoms that they are experiencing, fatigue, anergia, sleep and appetite disturbances, and weight changes, are related to prenatal depression because many of these symptoms are associated with normal changes in childbearing (Lintner & Gray, 2006; Westdahl, et al; Nonacs, 2006).

### *Detection of prenatal depression*

Research indicates that of the women who experience depressive symptoms, less than 25% will seek treatment for their symptoms (Lintner & Gray, 2006). "Though we know that depression is relatively common among women during pregnancy, only a fraction of the women who suffer from depression are ever diagnosed, and even fewer ever receive any type of treatment (Nonacs, 2006, p.112)." Perhaps the most alarming component of the relatively small number of women who seek treatment for their depressive symptoms during pregnancy is that pregnancy, for most women, represents a time of increased interaction with their healthcare providers (Nonacs, 2006).

The lack of discovery and diagnosis of prenatal depression is a multifaceted problem. Some of the diagnostic difficulty may be attributed to a lack of provider information regarding the disorder. The American Obstetrician, or prenatal care provider, is typically underprepared in understanding and mastering the clinical treatment of prenatal depression. “Many obstetricians, like other health care professionals, have received only the most rudimentary training in the area of mental health and are unable or uncertain how to diagnose depression or similar problems in their patients (Nonacs, 2006, 112).”

Smith, Rosenheck, Cavaleri, Howell, Poschman, and Yonkers (2004) set out to explore the accuracy and incidence of accurate diagnosis and identification of mental health disorders by healthcare providers in the prenatal period. They administered written screening tools to women prior to a prenatal visit with their health care provider. Smith, et al (2004) found that 99 of the 387 pregnant women surveyed reported scores on their written assessment that were indicative of depression, with 17 women reporting suicidal ideation. The study then analyzed the same subjects after their prenatal visit, to identify whether the provider assessed for or attempted to identify the presence of depression or depressive symptoms during the visit. Of the 99 women identified as depressed by the written surveys administered prior to their visit, only 2 women were correctly identified by their healthcare provider. Among the 17 women with suicidal ideation, the providers only correctly identified 2 women during their prenatal visit (Smith, et al., 2004).

### *Barriers to seeking care*

Women who are aware of their symptoms and who feel that they may be depressed may be further discouraged from seeking care for their symptoms during pregnancy due to societal expectations (Westdahl et al, 2007). Pregnancy, though portrayed in popular culture as a time of complete and uninterrupted happiness and joy, can be a time of emotion upheaval. “While life transitions may bring happiness, they also have the potential to cause enormous stress. During

these times of transition women are most vulnerable to emotional problems (Nonacs, 2006, p.109).” Women are most vulnerable to having a new onset of depression during their childbearing years (Orr et al., 2007) Pregnancy, a time of taking on new roles, adjusting to new demands, and trying to adapt to physical changes is a time that places an expectant mother at increased risk for developing depressive symptoms.

### *Prenatal depression and its effects on pregnancy and maternal-fetal outcomes*

Prenatal depression is a significant problem because of the myriad of psychosocial, somatic, and obstetrical complications it poses. One of the major concerns associated with prenatal depression is its effects on the mother’s self-care practices and her compliance with medical advice. Research has shown that depression in pregnancy may have a negative relationship with positive health practices such as nutrition, exercise, and regular prenatal care (Lindgren, 2001). Lindgren (2001) goes on to suggest that prenatal depression is also associated with smoking, alcohol use, drug abuse, and poorer health behaviors in general, especially in the first trimester. Vesga-Lopez et al. (2005) agrees that prenatal depression leads to poorer maternal health practices. Psychiatric disorders during pregnancy, including prenatal depression, are associated with poor maternal health and inadequate prenatal care (Vesga-Lopez et al., 2005).

Depression in pregnancy may cause women to have fewer positive health practices than non-depressed women (Lindgren, 2001; Nonacs, 2006). “Depression in the prenatal period has been associated with poor weight gain (reflective of diet), use of alcohol (M.R. Boyd & Hauenstein, 1997; Zuckerman, Amaro, Baucher, & Caral, 1989), drug abuse (M.R. Boyd & Hauenstein; Haller, Knisely, Dawson, & Schnoll, 1993; Zuckerman et al.), smoking (Pritchard, 1994; Zuckerman et al.), and overall poorer health behaviors in the first trimester of pregnancy (Lindgren, 2001). Bennet et al. (2004) states that depressed women often are delayed in seeking prenatal care and that this delay increases their risks for preeclampsia, poor pregnancy outcomes, and progression into



postpartum depression. Orr, et al. 2007 found that women who reported higher levels of depressive symptoms have a higher self perception of diminished health and functional status during pregnancy.

Other studies go further in correlating prenatal depression to negative maternal-fetal outcomes. Depression has been strongly correlated with spontaneous preterm labor (Luskin, et al., 2007). Nonacs (2006) also found that women who are depressed experience pre-term labor twice as often as women who are not affected by depression during their pregnancy. “The high levels of stress hormones, including cortisol and adrenaline, produced may affect the placenta, decreasing the flow of nutrients to the developing fetus (Nonacs , 2006, p.118).” Changes initiated by elevated stress hormone production secondary to depressive symptoms in pregnancy may also alter the brain activity of the fetus, leading to architectural and long-lasting changes in development (Nonacs, 2006, p.118). Another study, conducted among European mothers, indicated that “women with high depression scores were at greater risk for spontaneous preterm birth (Dyan, Creveuil, Marks, Conroy, Herlicoviez, Dreyfus, et al., 2006).”

Another significant and alarming result of prenatal depression is its effect on maternal-fetal bonding. “Depressive symptoms such as a lack of interest in daily activities and a sense of hopelessness, may also act to curb a pregnant woman’s developing relationship with the fetus (Lindgren, 2008). Depression in the prenatal period is disruptive to maternal-infant bonding (Luskin et al., 2007). Lindgren’s article *Relationships Among Maternal Fetal Attachment, Prenatal Depression, and Health Practices in Pregnancy*, (2001), reports that her study of pregnant women demonstrated a correlation between increasing self-reported depressive symptoms and negative maternal-fetal attachment and bonding. Vesga-Lopez, et al. (2005) evaluated the role of psychiatric disorders in the prenatal period and found that “maternal psychiatric disorders during pregnancy and the postpartum period are also associated with numerous adverse outcomes for the offspring,

including maladaptive fetal growth and development, poor cognitive development and behavior during childhood and adolescence, and negative nutritional and health effects (p.805).”

Perinatal depression poses significant risks during the prenatal period, many of which have already been discussed. However, prenatal depression is also the most significant predictor of postpartum depression (Lintner & Gray, 2006; Records & Rice, 2007). Women who have history of prenatal depression or anxiety are increasingly at risk for postpartum depression (PPD), a serious complication following childbirth. Women experiencing PPD may exhibit “disinterest, anxiety, fear, anger, or over concern about the baby,” with more severe cases leading to “thoughts of harming themselves, the baby, or others (Lintner & Gray, 2006; APA, 2000; Miller, 2002).”

Prenatal depression is a problem that poses significant threats to the mother-baby dyad both in the prenatal and postpartum period. However, the prevalence of this issue is not fully known or understood, and is underrepresented in the literature. In order to further the understanding of prenatal depression and its prevalence, we will compare our data regarding prenatal depression with data from current (conducted in the past five years) studies that have also been conducted in the United States. We will compare self-reported findings on the Centers for Epidemiological Studies Depression Scale (CES-D) for similarity.

### **Research Questions**

Data collected from the Centers for Epidemiologic Studies Depression Scale (CES-D), the Pregnancy Risk Assessment Monitoring System (PRAMS), and results from additional studies in the last five years reporting prenatal depression by using the CES-D were analyzed to address the following questions:

- 1.) What is the frequency of self-reported risk for depression in women in the Kansas City area at enrollment (prior to 21 weeks gestation) and at 34 weeks gestation as measured by the CES-D?
- 2.) Are pregnant women in the Greater Kansas City area self-reporting similar frequency indicative of risk for depression on the CES-D at enrollment and 34 weeks gestation to women studied throughout the United States during the past 5 years?
- 3.) What is the frequency of depression, as indicated by elevated CES-D scores, among women who report the following maternal behaviors on demographic and PRAMs surveys administered at enrollment and approximately 34 weeks gestation:
  - a. Alcohol Consumption
  - b. Cigarette Usage
  - c. Age
  - d. Medicaid or Private Pay Insurance Status

## RESEARCH METHODOLOGY

This sub-study was conducted using information obtained from a larger, descriptive, longitudinal research study conducted as part of an ongoing pilot study aiming to investigate and compare perinatal maternal stress, depression, pregnancy outcomes, and cost of care in privately and publicly insured populations of pregnant women. Prior to data collection, approval from the Institutional Review Board (IRB) of a midwestern academic medical center was obtained for the larger pilot study. This study was conducted using a convenience sample of pregnant women who were publicly or privately insured and who resided in the greater Kansas City area. Subjects were enrolled prior to 21 weeks gestation. Participants were asked to participate in the study during

their first prenatal visit. An informational brochure about the study was provided. The PI or a Research Assistant discussed the study and consent form in person, prior to the subject consenting in order to answer any questions. Data collection occurred at four maternity care offices in a midwestern metropolitan area. Study inclusion required participants to be 21-30 years of age with no previous history of preterm birth (defined as prior to 37 weeks gestation) and experiencing no complications with their current pregnancy. Participants were to be enrolled prior to the end of their 21<sup>st</sup> week of gestation, and all resided within the Greater Kansas City area. Participants were required to be either publicly insured (through Medicaid) or privately insured at the time of enrollment. All participants were required to be fluent in speaking and reading the English language. A total of 66 women were enrolled in the study.

After consent was obtained, participants were asked to complete a set of surveys at enrollment, at 34 weeks gestation, 2 weeks postpartum, and at 2 months postpartum. Demographic data was obtained at enrollment. Surveys were conducted by mail or phone interview based on participant preference. Phone Interviews were conducted by research assistants and usually lasted from 15 to 30 minutes depending on individual variation and the number of questions to be asked in each survey period. Participants completed four survey sets, 2 in the prenatal and 2 in the postpartum period. Remuneration for full participation in the study was given via distribution of \$20 store gift cards, which were distributed to participants at after the completion of the Time 2 (34 weeks gestation) and Time 4 (2 months postpartum) surveys.

### *Demographic Characteristics of Study Sample*

Demographic characteristics of the study sample were obtained from the demographic information sheet [Appendix A] that participants completed at the time of enrollment. The average age of participants in this study was 25 years. Simple descriptive statistics found that 68.2% of women enrolled in the study were Caucasian, 11.8% of participants reported their ethnicity as

American Indian/Alaska Native, Asian or Black/African American, and 15 of the participants (22.7%) chose not to respond to this question. Additionally, 33.3% of women reported that they were homemakers (not employed or attending school) while 40.9% of participants either worked or attended school on a full-time basis. When evaluating partner status, 59.1% of the sample population reported being married, and 19.7% were single, never married. Educational achievement found that 26% of participants reported completion of a baccalaureate degree or higher, 25% reported completion of some college (no degree completed), and 13.3% of participants reported their highest level of education as attainment of a high school diploma or GED.

### Data Collection and Analyses

This sub-study primarily focused on the administration of the Centers for Epidemiologic Studies Depression Scale (CES-D) [Radloff, 1977] to identify risk for prenatal depression. The CES-D is a 20 question scale developed to identify depressive symptoms in the general population. Participants answer questions based on their mood during the 7 days prior to completing the survey, and respond using four point response set, ranging from 0-3, for each question. Scores can range from 0 to 60, with a score greater than 16 indicating the presence of depression or depressive symptoms. Cronbach's alpha in the general population is 0.85 (Radloff, 1977). The CES-D was administered at enrollment and again at approximately 34 weeks gestation.

The Pregnancy Risk Assessment Monitoring System (PRAMS) survey, a CDC instrument tool with national and state specific standardized questions to measure self-reported maternal attitudes and behaviors before, during, and shortly after pregnancy, was also administered to participants using mail or phone survey methods. The Centers for Disease Control (CDC) created this tool to improve maternal and infant healthcare and it is currently used in 37 states (CDC, 2006). Different combinations of PRAMS questions, designed to best fit the research questions of the larger study, were administered at enrollment, 34 weeks gestation, and 2 weeks post-partum.

This study used demographic information, attitudes and education during prenatal care, and reported risky behavior from subjects, during the first (prior to 21 weeks gestation) and second survey period (34 weeks gestation), to assist with understanding the population being studied.

This sub-study also compared the rates of prenatal depression reported by subjects participating in the current longitudinal study conducted in the Greater Kansas City area, with results from other studies using the CES-D to identify depressive rates in women. The studies for comparison had to meet specific inclusion criteria before being compared. Studies selected were current, being published within the last 5 years, were conducted in the United States, and used the CES-D as a method to identify depressive symptoms in pregnant women during the prenatal period. Studies were obtained by conducting comprehensive search of the following databases using the keywords “preg\*”, “\*natal,” “depress\*,” “CES\*.” All databases (CINAHL, Medline, PubMed) were searched from 2003 to the present, in order to identify only articles that were current and met our criteria of being conducted in the past 5 years. Studies conducted in countries other than the United States were eliminated. All studies evaluated were published in English.

Titles and abstracts of studies were evaluated for relevance to the topic, and if they met inclusion criteria, relevant articles then underwent further evaluation. Studies that met inclusion criteria were all research articles, with none being meta-analyses. Four studies were selected for comparison. All articles were analyzed and their data were combined in a data table [Appendix B].

## RESULTS

Statistical analysis was done by entering patient responses from the assessment tools used in this study into the Statistical Package for the Social Sciences (SPSS). Descriptive statistics and frequencies were collected to answer the identified research questions.

*What is the frequency of self-reported depression in women in the Kansas City area at enrollment (prior to 21 weeks gestation) and at 34 weeks gestation as measured by the CES-D?*

CES-D data collected at Time 1 (enrollment) and Time 2 (34 weeks gestation) were analyzed using descriptive and correlational statistics. Individual scores were assigned to each participant based on their response to each CES-D survey administered. Group trends were then analyzed using comparative analysis in the SPSS database. Totals for the prevalence of reported prenatal depression were obtained.

CES-D results in the prenatal period were the primary focus of this sub-study. Statistical analysis revealed that at the time of enrollment, participants (N=55) reported a mean CES-D score of 12.85 with a minimum reported score of 2, and maximum reported score of 40. Of the women who completed the surveys at enrollment, 30.9% of women either met or exceeded the cut-off score of 16 on the CES-D, indicating a higher likelihood of depression. During the second survey period, at approximately 34 weeks, a mean score of 10.17 was reported by participants (N=39), with a minimum score of 0 and a maximum score of 35. During the second survey period, 20.5% of women reported scores that exceed the cut-off for depressive symptoms on the CES-D.

*Are pregnant women in the Greater Kansas City area self-reporting similar frequency indicative of risk for depression on the CES-D at enrollment and 34 weeks gestation to women studied throughout the United States during the past 5 years?*

Similar studies were obtained through literature review and a comprehensive database search. Studies that met inclusion criteria were also analyzed for CES-D results. Results from each study were placed into a data table, and the results were then compared to the findings from this sub-study. Comparisons were made using a cut-off score of 16 or greater on the CES-D to indicate risk for depression or depressive symptoms.

In a cross-sectional study by Records & Rice (2007), 33% of women in their 3<sup>rd</sup> trimester of pregnancy reported CES-D scores that met or exceeded the CES-D cut off of 16, indicating an increased likelihood of depression or depressive symptoms. Westdahl, et al. (2007) also used a cross-sectional study to analyze the prevalence of depression in women during their second trimester of pregnancy. Their administration of the CES-D instrument during a study of women in the prenatal period found that 33% of women reported a score of 16 or greater on the CES-D, with a mean score of 12.34. Orr, et al (2007) interviewed pregnant women to assess their level of depression as well as their personal health status perceptions. This study found elevated CES-D levels among 44% of women studied. The final study analyzed, by Marcus, et al. (2003) indicated that 20.4% of the women completing the CES-D in their study scored a 16 or greater. Therefore, comparative findings among the researcher's findings and the other studies suggest that a significant number of women in the Kansas City area, as well as women across the country are reporting elevated CES-D scores in the prenatal period. Despite differences in demographic characteristics, pregnant women who were included in this review still reported increased levels of depression and depressive symptoms in the prenatal period.

*What is the frequency of depression, as indicated by elevated CES-D scores, among women who report the following maternal behaviors on demographic and PRAMs surveys administered at enrollment and approximately 34 weeks gestation:*

- a. Alcohol Consumption*
- b. Cigarette Usage*
- c. Age*
- d. Medicaid or Private Pay Insurance Status*



All questions regarding maternal behaviors and characteristics were obtained through subjects' self-report on the demographic and PRAMS surveys that were administered as part of the larger, pilot study that this sub-study is derived from. Maternal alcohol consumption was measured by a PRAMS question that asked mothers to indicate the number of drinks they consumed on average during the three months prior to learning that they were pregnant. The mothers were given a set of predetermined responses that included, "I didn't drink then," "Less than 1 drink/week," "1-3 drinks per week," "4-6 drinks/week," "11-13 drinks per week," or "14 or more drinks/week." Maternal cigarette use was also determined by asking the participants to indicate their use of cigarettes during the three months prior to learning that they were pregnant. Mothers were able to indicate that they used "Less than 1 cigarette/week," "1-5 cigarettes/week," "6-10 cigarettes/week," "11-20 cigarettes/week," or "21-40 cigarettes per week." Maternal age was evaluated by self-reported age on the demographic sheet that participants completed at enrollment. Medicaid or Private Insurance status was also evaluated, through the use of a PRAMS survey question in the enrollment survey set. Mothers were asked to indicate whether they were publicly or privately insured by the question that asked, "How is your prenatal care paid for?." Participants were offered two responses to this PRAMS survey question, which were "Medicaid," and "Private Insurance." Responses to these questions, as obtained from the demographic and PRAMS questionnaires, were then evaluated using statistical and correlational data in order to relate participant responses to their total score on the CES-D administered in the prenatal period at enrollment and 34 weeks gestation.

PRAMS survey data indicated that 13.6 % of study participants (N= 55) reported consuming 4-6 drinks/week during the three months prior to learning that they were pregnant. Of the women who scored a 16 or greater on the CES-D at enrollment (N=16), 6 women or 37.5%, reported that they consumed 4 or more drinks per week during the three months prior to learning they were pregnant. Of participants with CES-D scores that met or exceeded the cutoff score, one participant

indicated that she consumed “11-13 drinks per week,” and one participant indicated that she consumed “14 drinks or more per week,” during the three months prior to learning that they were pregnant. Thus, our study data indicate that overall, 12.7% of all study participants reported increased alcohol consumption (at least 4-6 drinks per week or greater in the three months prior to pregnancy) along with a CES-D score of 16 or greater at enrollment. The second CES-D assessment (performed at 34 weeks gestation) indicated that 22.2% of women who reported a CES-D score of 16 or greater also f 4-6 alcoholic drinks or more per day in the three months prior to learning that they were pregnant. Only one participant who reported consuming 11-13 drinks per week prior to pregnancy also reported a CES-D score indicative of depression during the second survey period.

Maternal cigarette usage indicated that 7.6% of study participants consumed 1-5 cigarettes per day during the three months prior to becoming pregnant. In this study, 10.9% of participants who self-reported a CES-D score greater than or equal to 16 (N=12) also reported consumption of greater than one cigarette per day in the 3 months prior to learning they were pregnant. Of those women scoring greater than or equal to 16 on the CES-D at enrollment, 37.5% reported using 6 cigarettes or more during the 3 months prior to becoming pregnant. Results from the surveys administered at 34 weeks gestation indicate that 33.3% of mothers with a CES-D score greater than or equal to 16 also reported using 6 or more cigarettes per day in the 3 months prior to learning that they were pregnant. Overall, at the 34 week survey period, 7.9% of all participants reported increased levels of depression on the CES-D and a history of using 6 or more cigarettes a day during the three months prior to learning they were pregnant. An increased use of cigarettes and tobacco may put mothers at an increased risk of developing depression or depressive symptoms.

Maternal age and CES-D results were also evaluated for correlation during this study. The average age of participants was 25. At enrollment, 37% of participants who completed the surveys were 24 years of age or younger, and 63% of participants were 25 years of age or older. The highest

CES-D score at enrollment was reported by a participant who was 18 years old. However of those women who scored greater than or equal to 16 on the CES-D at enrollment, 31.3% were 24 years of age or younger. Of the participants who scored a 16 or greater on the CES-D at enrollment, 68.8% were 25 years of age or older. The initial administration of the CES-D survey, at enrollment, revealed that of the 32.4% of participants who reported being 25 years of age or older (N= 34) also reported scores that met or exceeded the CES-D cutoff score, while 25% of women who reported an age of 24 years or younger (N= 20) reported scores that exceeded the CES-D cutoff in this time period. In the second survey period, 20% of participants who were 25 years of age or older reported a CES-D score of 16 or greater. In this same survey period, conducted at 34 weeks gestation, 30.8% of participants who were 24 years of younger (N=13) reported a CES-D score at or above 16. Overall, 50% of participants who scored a 16 or greater on the CES-D during the second survey period were 25 years of age or older. The highest CES-D score in the second survey period was reported by a participant who was 26 years old.

In this study, participants were asked to indicate their insurance status. At enrollment the 66 women surveyed indicated that 28.8% were insured by Medicaid of Kansas, 51.5% were privately insured, 3.0% indicated that they did not have either Medicaid or Private insurance, and 16.7% of participants did not respond to this question. Medicaid and private payer status were also correlated with CES-D results to look for possible trends. At enrollment, 42.1% of participants insured by Medicaid (n= 19) reported a CES-D total of 16 or greater. Participants who reported that they were privately insured (n=34) and reported a CES-D score of 16 or greater at enrollment accounted for 25.2% of the total number of privately insured women surveyed. At 34 weeks gestation, 36.4% of Medicaid participants (n=11) reported a CES-D of 16 or greater. Of the privately insured participants who completed the CES-D at 34 weeks gestation (n=25), 16% reported CES-D scores of 16 or greater.

## DISCUSSION

All data collected from the current longitudinal study that this sub-study is based on was analyzed using descriptive statistics and frequencies.

The participants in this sub-study were predominantly white women who were seeking care at maternity care offices in the Greater Kansas City area. Women were both publicly and privately insured. Our results may be generalized to groups of women with similar characteristics; however, more research would need to be conducted with other groups of women to determine whether or not the findings are valid across racial, socioeconomic, educational, marital, and insurance statuses.

The CES-D results obtained through the original longitudinal study that this sub-study is a part of indicated that women in the Kansas City area are reporting significant levels of risk for prenatal depression as indicated by elevated CES-D scores. This data seems to correspond with data that has been collected through similar studies, using the CES-D, that were conducted in the United States during the past 5 years. Similar studies have indicated that the presence of prenatal depression has ranged from 20-44%. Our study indicates that risk for prenatal depression, as defined as a CES-D score of 16 or greater, occurred in approximately 20-30% of our participants in the prenatal period. This data indicates the need for increased screening and provider awareness regarding depression and depressive symptoms in the prenatal period. The elevated prevalence of depression in women in the prenatal period, across different geographic and socioeconomic circumstances indicates that this screening should be wide-spread, and should not specifically be targeted at women who have less education, are younger, and have access to fewer resources. Our study indicates that prenatal depression is occurring in a primarily Caucasian, older, more educated, primarily married demographic, while many of the studies previously conducted to evaluate depression in the prenatal period have focused on younger, less educated, more

socioeconomically disadvantaged mothers. Study findings indicate that prenatal depression is not reserved for the financially disadvantaged, or those who have limited access to resources or support, but that it occurs across a variety of demographic and socioeconomic situations.

Maternal behaviors data, as obtained by self-report from mothers on the demographic form and PRAMS Survey indicates that a significant number of women in their childbearing years are consuming 4-6 drinks a week or more, along with more than 5 cigarettes a week during the 3 months prior to learning that they are pregnant. This risky behavior is alarming due to the potential teratogenic effects that alcohol and tobacco can have on a developing fetus, especially in the early days and weeks of development. Findings also indicate that a significant number of mothers who are using these substances prenatally are reporting elevated levels of depression as measured by the CES-D. Provider awareness of the incidence of alcohol and cigarette use among mothers prior to conception may help facilitate discussions that will increase the health of the mother and her pregnancy. Risky behaviors that occur prior to pregnancy increase the likelihood of developing a risk for prenatal depression, and should be taken seriously.

Findings regarding maternal age and the incidence of elevated CES-D scores indicate that depressive symptoms were not directly related to age. The CES-D results of this sub-study, when correlated with age, indicate that mothers over the age of 25 that reported elevated CES-D scores more frequently at enrollment than mothers who were 24 years of age or younger, indicating risk for depression. This information is important because many previous studies have indicated a link between a younger age and prenatal depression. In the second survey period, 30.4 % of participants who were 24 years of age or younger reported elevated CES-D scores, compared with 20% of participants who were 25 years of age or older. This study emphasizes that prenatal depression is not confined to a certain age range. Risk for prenatal depression, as defined by elevated CES-D scores obtained at enrollment, in this study occurred more than twice as often in

participants who were 25 years of age or older. In the second survey period, a greater percentage of participants who were 24 years of age or younger reported elevated CES-D scores. Due to the descriptive nature of these findings, no generalized conclusions of significance can be made regarding CES-D scores, depression risk, and age. However, providers must be aware that depression may occur at any age, and must screen women for depression despite their maturity and age.

Publicly insured women (those who indicated that they were insured by Medicaid) were more likely to report a CES-D score that indicated risk for depression, at both enrollment and at 34 weeks gestation than women who reported that they were privately insured. At both time periods, the mothers who were publicly insured reported significantly higher levels of depressive symptoms, as evidenced by their elevated CES-D scores. This information is important, but it must also be noted that mothers who were insured by Medicaid made up a smaller portion of the sample population, and thus, fewer Medicaid mothers were studied..

### *Limitations*

The small sample size, high attrition rate and geographic location of the pilot study limit the ability to generalize the information obtained from this study to the population as a whole. The recruitment and retention of participants has proved to be the greatest challenge in conducting this survey. Attrition has affected the sample size. Literature shows that depressed mothers may be less likely to participate in studies and data collection. Therefore, the loss of participants may have affected the validity of the incidence of reported prenatal depression in this study.

This sub-study used the CES-D alone to indicate risk for depression or depressive symptoms among participants. The CES-D is a screening tool, not a diagnostic tool. Though our study used the well established and documented cut-off of a score of 16 or greater to indicate the presence of prenatal depression, a score at or above 16 is only indicative of depression, not diagnostic. True

rates of depression can only be confirmed by professional evaluation. The information obtained in this study used the CES-D to estimate the prevalence of depression among women. Also, many other tools exist to evaluate depression; however, studies that used these tools were eliminated to allow for accurate comparison of results.

### *Strengths*

One strength of this study was that it looked at a primarily Caucasian (68%), Married (59%), Educated (26% report completion of a baccalaureate degree, while 25% have completed some college but have not attained a degree, and 13.3% report completion of high school or a GED program). This demographic is previously underrepresented in the literature. Findings from this study confirm the need for universal screening for depression in the postpartum period by indicating that prenatal depression affects mothers from a variety of backgrounds and socioeconomic classes. Thus, socioeconomic status, education, marital status, and ethnic origin appear to be neither a risk nor a protective factor when it comes to prenatal depression.

## CONCLUSION

Prenatal depression poses obvious risks to the mother-fetus or mother-child dyad both during the prenatal period and beyond. Prenatal depression is a serious problem, and is also a problem which occurs in a large number of expectant mothers, but that goes largely undiagnosed. The risks associated with prenatal depression include reduced maternal fetal bonding, decreased maternal health, poorer birth outcomes, and potential for postpartum or recurrent depressive episodes throughout the mother's lifetime. This serious problem calls for more research. Additionally, the high levels of prenatal depression or depressive symptoms among mothers indicated a need for universal screening of expectant mothers for depression. Risky behaviors and characteristics of mothers in this study call attention to the fact that prenatal depression does not

affect one population, and that this disease can strike in any demographic and any population. Screening in the prenatal period must be increased. The consistency of depressive symptoms in the prenatal period reported by the CES-D by a variety of participants from differing socioeconomic and educational backgrounds, as well as multiple geographical areas indicates that it is simple and reliable tool that should be used to screen for depressive symptoms, and then used to facilitate discussion among the provider and patient. Screening patients for risky behaviors, as well as depressive symptoms may prove to be clinically useful in assessing for depression, but more importantly, this screening should occur as a means increase health in pregnant women across the board. This study indicates an increased need for screening in maternal care offices, as well as an increased understanding of the prevalence of depression across a wide range of demographic characteristics. Practitioners must use this information to screen for depression in their patients in order to provide complete, ethical care.



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APPENDIX A

A Comparison of Pre and Postnatal Maternal Stress, Depression, Pregnancy Outcomes, and Cost of Care in Private and Publicly Insured Populations of Pregnant Women

**Demographic Data Form: Enrollment Information**

1. Age in Years: \_\_\_\_\_
2. Estimated date of delivery: \_\_\_\_\_
3. Number of weeks pregnant at enrollment: \_\_\_\_\_
4. Social Security Number: \_\_\_\_\_ (Necessary for remuneration of Target gift certificates for completing survey's)
5. Ethnicity/Race: Please check all that apply
  - \_\_\_\_\_ American Indian or Alaska Native
  - \_\_\_\_\_ Asian
  - \_\_\_\_\_ Black or African American
  - \_\_\_\_\_ Native Hawaiian or Other Pacific Islander
  - \_\_\_\_\_ White
  - \_\_\_\_\_ Hispanic or Latino
  - \_\_\_\_\_ Not Hispanic or Latino
  - \_\_\_\_\_ Unknown
  - \_\_\_\_\_ More than one race
6. Educational Level: Please check one of the following
  - \_\_\_\_\_ 8<sup>th</sup> grade or less
  - \_\_\_\_\_ 9-12<sup>th</sup> grade; no diploma
  - \_\_\_\_\_ High school graduate or GED
  - \_\_\_\_\_ Some college credit no degree
  - \_\_\_\_\_ Associate degree
  - \_\_\_\_\_ Bachelor's degree
  - \_\_\_\_\_ Masters Degree
  - \_\_\_\_\_ Doctorate or Professional degree
7. Employment Status: Please check all that apply
  - \_\_\_\_\_ Homemaker/full time mother
  - \_\_\_\_\_ Maternity leave job/school
  - \_\_\_\_\_ Part time job/school
  - \_\_\_\_\_ Self employed work/home
  - \_\_\_\_\_ Full time job/school
8. Marital Status: Please check one of the following
  - \_\_\_\_\_ Married
  - \_\_\_\_\_ Single (never married)
  - \_\_\_\_\_ Divorced
  - \_\_\_\_\_ Separated
  - \_\_\_\_\_ Widowed
  - \_\_\_\_\_ Living with partner
9. County of Residence: \_\_\_\_\_
10. Planned location for labor and delivery: \_\_\_\_\_

APPENDIX B

Authors/ Year/ Country/Article/ Purpose	Study Design/ Sample Size	Data Collection	Outcome Measurement	Strengths	Weaknesses	Results
Records & Rice (2007) USA Psychosocial Correlates of Depression Symptoms During the Third Trimester of Pregnancy  "To explore the psychosocial correlates of depression symptoms during the third trimester of pregnancy"	Cross-sectional Design  139 women in 3 <sup>rd</sup> trimester  Most women were married and Caucasian	Participants were given questionnaires with data collectors present in an office or home setting. All participant answered instrument in the same order, data collectors were present during the filling out of instruments and then reviewed instruments and dialogued if any additional info was needed.  After birth CHQ were completed through the use of participants medical records	Predictors of Postpartum Depression Inventory-Revised (PDPI-R)  Center of Epidemiologic Studies Depressed Mood Scale (CES-D)  Severity of Violence Against Women Scale (SVAWS)  Childbearing Health Questionnaire (CHQ)  Lifetime Hx of physical and sexual abuse questions  DSM-IV Criteria	Multiple data sources increases validity Tools used have been tested for reliability and validity this increase the validity and the reliability  Use of Selye's stress response theory and a biopsychosocial model  Equal across socioeconomic status, marital status, & # of pregnancies increases validity  The use of the same tools, in the same order by educated data collectors increased the reliability of data	Convenience sample participants may have had a personal interest in study  Mostly Caucasian in US does not provide a general representation of population decreases the validity  Participant possible failure to disclose depression or abuse decreases the reliability of the data  Some single-item screening measures	Prenatal depression screening is needed  1/3 of sample exceeded the CES-D cutoff for depression  1/3 reported a hx of abuse  1/5 reported depression during previous pregnancy that lasted 2w-8m  ½ responded + to the PDPI-R item asking if felt depressed during current pregnancy  Lifetime abuse did not contribute  Supportive partners and marital satisfaction, significant contributors Gravida minor, but significant contributor
Westdahl, et al. (2007) USA  Social Support and Social Conflict as Predictors of Prenatal Depression  "To estimate how social support and social conflict relate to prenatal depressive symptoms and to generate a brief	Prospective study  1,047 participants from early pregnancy-1 yr postpartum recruited from New Haven Hospital System, New Haven, Connecticut and Grady Memorial Hospital	Baseline interview in the 2 <sup>nd</sup> Trimester (ave 18 w) Structured interview were audio computer-assisted self-interviewing	7-item subscale of the Social Relationship Scale  7-items of social conflict of the social relationship Scale  CES-D – 15 cognitive-affective items of the scale  Demographic information provided Level of community poverty  Baron and Kenny Framework for	Dual Language increases validity  Audio computer-assisted interviewing increased reliability  All procedure approved increased validity  68% participation rate increased reliability and validity  CES-D used increases	Self Interviewing decreased reliability  Mostly young nulliparous With limited socioeconomically status decrease validity  Mostly African-American and Latina decreased validity  Social support and social conflict questionnaire untested decreased	Rates of depression during the 2 and 3 trimester or substantial  The rates of depression tend to be greater in low socioeconomic status women then the entire population  Social Conflict play a substantial role in depressive symptoms  Social Support

## Screening for Prenatal Depression

clinical tool to identify women at increased psychosocial risk.”	and Atlanta GA  Data is from a larger study a randomized controlled trial  Inclusion Criteria: Pregnant <24 w, age 25 or <, no severe medical problems, able to attend groups in English or Spanish, willingness to be randomly assigned		testing for interactions	reliability and validity  Sample size increase validity  Hierarchical Regression Analysis increases validity  2 distinct population increases validity	reliability and validity	doesn't buffer women from effects of conflict as predicted.  # of risk factor tend to increase the likelihood of depression  33% of participants reported a score greater than or equal to 16 on the CES-D  Mean CES-D score was 12.74
Orr, et al (2007) USA  Depressive Symptoms and Indicators of Maternal Health Status during Pregnancy  To investigate the relationship between depressive symptoms and health/functional status among pregnant women.	Self reporting Cross-sectional study  Recruited from Pitt County Memorial Hospital and Brody School of Medicine, East Carolina University  Inclusion criteria: >or=16 yr, Seeking prenatal care	A single interview at time of enrollment 52% during 1 <sup>st</sup> trimester, 37% 2 <sup>nd</sup> trimester. All were seeking prenatal care	CES-D  Maternal Health Status questions modeled after the National Health Interview Survey  Assessed limitation in performing activities  Identified as smokers  Logistic regression models: Maternal age, education, race, marital status, insurance, smoking, trimester	CES-D increases reliability and validity  Trained research assistant obtained consent and conducted interview increases reliability and validity  Large sample size increases validity	Self reporting decreases reliability  Only one exclusion criteria defined decreases validity  Only completed in one part of the country decreases overall population validity  Majority were Medicaid patients and black decreased validity	Women with clinical significant depression or major depression report health and functional status lower by 2 times  Increased depressive symptoms are associated with diminished health and may explain an association between depressive symptoms and preterm birth  44% of participants scored greater than or equal to 16 on the CES-D  Women with elevated CES-D scores were more likely to report their health as fair or poor than women with CES-D scores less than or equal to 16
Marcus, et al (2003)	Self reporting	Screened using a 10 minute	CES-D	Large number of participants	Self Reporting decreases reliability	A large number of women showed

## Screening for Prenatal Depression

<p>USA</p> <p>Depressive Symptoms among Pregnant Women Screened in Obstetrics Settings</p> <p>“This study aimed to describe the prevalence of depressive symptomatology during pregnancy when seen in obstetric settings, the extent of treatment in this population, and specific risk factors associated with mood symptoms in pregnancy. “</p>	<p>Cross-sectional Study</p> <p>3472 pregnant women with an average weeks of gestation at 25 with a range from 3w to 41 w</p> <p>Inclusion criteria 18 yrs or older</p>	<p>questionnaire during the wait to receive prenatal care in 10 OB clinics in Michigan</p>	<p>Demographics, tobacco and Alcohol (TWEAK)</p> <p>Antidepressant medication, past hx of depression, current tx for depression</p> <p>Bivariate logistic regression</p>	<p>increases validity</p> <p>CES-D increases reliability and Validity</p> <p>TWEAK increase validity</p> <p>Current depression and tx assessment increases validity</p> <p>Use of 10 clinics increase validity</p> <p>Lg variety of ages increases validity</p> <p>Bivariate logistic regression increases validity and reliability</p>	<p>Very little exclusion criteria decrease validity</p> <p>Population majority was Caucasian</p> <p>Most women were married with a High education</p>	<p>signs of depression very little were dx and/or receiving tx for depression.</p> <p>Hx of depression, poor health, alcohol use, smoking, unmarried, unemployment, low educational attainment were significantly associated with symptoms of depression.</p> <p>There is a need to screen all pregnant women for depression which could decrease negative maternal and infant outcomes.</p> <p>20.4% of pregnant women had elevated depressive symptoms (n=689)</p> <p>13.8% of depressed women (n=91) reported that they were receiving any type of formal treatment</p> <p>Women with a prior history of depression were 4.9 times more likely to have an elevated CES-D score than women without a history of depression</p>
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