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SOCIOECONOMIC STATUS AND SYMPTOMS OF ANXIETY AND DEPRESSION IN

PREGNANT WOMEN FROM THE SOUTHERN UNITED STATES

By
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A thesis submitted to the University of Mississippi in partial fulfillment of the requirements of
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ABSTRACT

MEAGAN KERRY MANDABACH: Socioeconomic Status and Symptoms of Anxiety and

Depression in Pregnant Women from the Southern United States

(Under the direction of Dr. Danielle J. Maack)

Pregnancy is a period of great change in a woman's body as her baby develops. During

this period, women commonly experience symptoms of anxiety (Dennis et al., 2017) and

depression (Shidhaye & Giri, 2014). Literature has suggested that socioeconomic status (SES)

can contribute to the severity at which pregnant women experience anxiety and depression

(Arora & Aeri, 2019; Field et al., 2008; Shagufta & Shams, 2019), and women of low

socioeconomic status may be more likely to experience symptoms of anxiety and depression

during pregnancy (Field et al., 2008).

The present study aimed to assess the relationships between household income and

experience of anxiety and depression symptoms, in pregnant women in Mississippi. Specifically,

it was hypothesized that lower SES would be associated with increased experience of anxiety

and depressive symptoms.

Participants included 557 pregnant women (77.4% white; M_{age} = 28.42) recruited at an

OBGYN clinic in north Mississippi. Demographics questionnaire and several self-report

measures including the Depression Anxiety Stress Scale-21 (DASS-21; Lovibond & Lovibond,

1995) and the Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, Sagovsky, 1987)

were completed.

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Results demonstrated that symptoms of anxiety measured by the DASS-21 were significantly higher in pregnant women earning less than $10,000 per year than all other income brackets (with the exception of the $31,000 to $51,000 level). Additionally, symptoms of depression measured by the DASS-21 were significantly higher in pregnant women earning less than $10,000 per year than all other income brackets (with the exception of the $31,000 to $51,000 level). No other household income levels significantly differed from each other on the DASS-21. Additionally, women whose income was less than $10,000 per year experienced significantly higher levels of depressive symptoms (as rated by the EPDS) than all other income levels. No significant differences were seen among any other SES level.

The findings of this study supported the hypotheses that women of lower-income would have greater experience of anxiety and depression than those with higher incomes. These results are consistent with existing literature regarding socioeconomic status and symptoms of anxiety and depression in pregnant women, and they suggest a need for focusing on the mental health symptoms of pregnant women, regardless of socioeconomic status.

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Introduction

1. *Pregnancy*

1.1 Pregnancy Defined

Pregnancy, as defined by the National Institute of Health, is "the period in which a fetus develops inside a woman's womb or uterus" ("About Pregnancy," 2017). This period lasts approximately forty weeks (Jukic et al., 2013), or nine months, and is divided into three trimesters ("About Pregnancy", 2017). In the first trimester, a fetus begins to develop their body structure and organs. During this period, the mother experiences a surge in human chorionic gonadotropin hormone around week five, which is produced by the blastocyst, signaling the ovaries to halt the releasing of eggs and to increase levels of estrogen and progesterone (Mayo Clinic Staff, 2017). In the second trimester, the fetus begins to develop urine at week thirteen, move its eyes at week fourteen, begin to hear at week eighteen, and respond its mother's voice at week twenty-five (Mayo Clinic Staff, 2017). In the third trimester, the baby undergoes rapid weight gain beginning at week thirty-one, practices breathing at week thirty-two, and can detect light at week thirty-three (Mayo Clinic Staff, 2017).

1.2 Pregnancy Prevalence

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In 2018, The Centers for Disease Control and Prevention reported that 3,791,712 births were registered in the United States (Martin et al., 2019). The birthrate, when compared to that of 2017, has declined by 2% (Martin et., 2019). Birth rates for females aged 15-19 and 20-34 have declined, while birth rates for females aged 35-44 have increased (Martin et al., 2019). More specifically, in 2018, 37,000 births were reported in the State of Mississippi. The total fertility rate, as defined as the number of children who would be born per women if she were to bear children in her childbearing years (Elkasabi, 2019), was 1,842.0 in Mississippi, slightly higher than the national total fertility rate of 1,729.5. (Martin et al., 2019). The total fertility rate in Mississippi remained unchanged from that of 2017 (Martin et al., 2019).

1.3 Pregnancy and its Challenges

Pregnancy is a time of immense changes in a woman's body as her baby develops. Women's bodies rapidly change in shape and size. During a 40-week pregnancy, a pregnant woman will typically gain approximately 29 pounds with weight gain being particularly noticeable in the breasts and waist (Duncombe, et al., 2008). This weight gain can be attributed to the growth of both fetal and maternal tissues and fluids (Hector & Hebden, 2013). Such tissues and fluids include the uterus, breasts, blood, amniotic fluid, and extracellular fluid (Hector & Hebden, 2013). Aside from weight gain, women experience numerous additional symptoms that may bring about discomfort. In the first trimester, which comprises week zero through thirteen of pregnancy, women may experience symptoms such

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as nausea and vomiting, breast tenderness, and fatigue ("Pregnancy the three trimesters", 2019). Nausea and vomiting of pregnancy (NVP), with symptoms ranging from mild to severe, affects up to 80% of pregnant women (Koch et al., 2006; O'Brien & Zhou, 1995). The pathogenesis of NVP is unknown (Koch et al., 2006; Lee & Saha, 2011); however, metabolic and endocrine have been implicated in its cause with human chorionic gonadotropin (hCG) being a likely culprit (Lee & Saha, 2011). This is due to the temporal relationship between the peak of NVP and hCG production from weeks twelve to fourteen (Lee & Saha, 2011). By the second trimester (week fourteen through twenty-six), these symptoms may decrease and be replaced by back and abdominal pain ("Pregnancy the three trimesters", 2019; Yousefabadi et al., 2019). This pain can be attributed to rapid weight gain and changes to the body's center of gravity (Yousefabadi et al., 2019). In the third trimester (week twenty-seven through forty), women may have shortness of breath and trouble sleeping ("Pregnancy the three trimesters", 2019). A postnatal survey of 650 women by Hutchison et al. (2012) indicated that women cited discomfort, pain, and mental preoccupation as reasons for poor sleep during late pregnancy.

Literature has consistently suggested that women having poor mental health during the perinatal period is common (MacQueen et al., 2016). Pregnant and postpartum women experience anxiety at significantly higher rates (22% prevalence across trimesters) compared to adults in the general population (18.1% prevalence (Kessler et al., 2005)) and these disorders, in particular, are the most common mental health problems experienced in this population (Dennis et al.,

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2017). Despite the numerous detrimental consequences of poor mental health during pregnancy, poor mental health during pregnancy is under-diagnosed and often left untreated (Beyondblue, 2011)

2. *Anxiety*

2.1 Anxiety Defined

The DSM-5 defines Generalized Anxiety Disorder as "Excessive anxiety and worry (apprehensive expectation), occurring more days than not for at least 6 months, about a number of events or activities (such as work or school performance)" (American Psychiatric Association, 2013). Accompanying the worrisome thoughts, physical manifestations of anxiety include restlessness, fatigue, difficulty concentrating, irritability, muscle tension, and sleep disturbance. At least three of these symptoms must present for the majority of days for the past six months (American Psychiatric Association, 2013). Anxiety disorders are the most common among mental disorders, affecting 18.1% of adults (Kessler et al., 2005). Women are more likely than men to develop anxiety over their lifetime (McLean et al., 2011, Angst & Dobler-Mikola, 1985, Bruce et al., 2005) with lifetime prevalence of 30.5% for women and 19.2% for men (Kessler et al., 1994). Possible risk factors for women's increased propensity for anxiety disorders, includes negative affectivity, which is a seen at greater rates among girls (McLean et al., 2001, Steiner et al., 2002), and neuroticism, which is linked more closely to anxiety and depression in women (McLean et al., 2011).

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2.2 Anxiety and Pregnancy

Anxiety symptoms are common in the pregnant population with a recent meta-analysis finding that 22.9% of pregnant women report experiencing such symptoms (Dennis et al., 2017). Symptoms of anxiety are concerning as they are associated with negative outcomes for both the mother and the fetus, including increased neonatal morbidity (Lilliecreutz et al., 2011) and an increased risk of postpartum depression (Davey et al., 2011*)*.

A prospective longitudinal study by Lee et al., (2007), assessed women at an antenatal clinic of a Hong Kong regional hospital to estimate the prevalence and course of antenatal anxiety and depression across the different stages of pregnancy and to identify associated demographic and psychological risk factors. Researchers administered the Hospital Anxiety and Depression Scale to assess antenatal anxiety and depression and the Edinburg Postnatal Depression Scale to assess postpartum depression (Lee et al. 2007). Results suggested that 17.8% of the women (N=335) endorsed experiencing antenatal anxiety during each trimester of their pregnancy, 15.4% of women endorsed antenatal anxiety during two trimesters, and 24.8% experienced antenatal anxiety during one trimester (Lee et al., 2007). These findings bolster literature that antenatal anxiety is common among pregnant women.

Additionally, Field and colleagues, (2003) examined 132 pregnant women to ascertain the effects of perinatal anxiety and comorbid depression and anger on the fetus and neonate. Pregnant women completed the Trait Anxiety Inventory

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and were asked to provide a urine sample for analysis (excreted catecholamines and their metabolites as a correlate of CNS neurotransmitter level). Results demonstrated that women, who endorsed high levels of anxiety also had increased levels of urinary excretions of norepinephrine and decreased levels of dopamine during the prenatal period (Field et al., 2003). Further assessment of fetus was conducted via ultrasound. Results found associations between high anxiety in the mother with lower fetal weight and lower abdominal circumferences in utero (Field et al., 2003). Postnatally, the anxious mothers exhibited lower levels of dopamine and serotonin (via urinary analysis) (Field et al., 2003). Anxious mothers' newborns were more likely to be classified as having a low birth weight, or weighing under 5.5 pounds, compared to newborns of mothers that did not experience anxiety (Field et al., 2003). This study suggests that anxiety negatively affects both the mother and the fetus in utero and postnatally.

Another potential concern for women who experience anxiety during their pregnancy is that anxiety during pregnancy has been associated with a significantly decreased likelihood to breastfeed (Grigoriadis et al., 2018). The World Health Organization recommends that infants are breastfed for the first six months of life (World Health Organization, 2003). Breastfeeding has been found to positively contribute to the health of both the mother and infant (World Health Organization, 2003). Literature suggests that breastfeeding positively contributes to the infant's immune system (Goldman, 2007) and cognitive development (Michaelsen et al., 2003). Breastfeeding may also increase the speed at which the mother's uterus returns to its pre-pregnancy state (Heinig & Devew, 1997) and

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promote a mother's bonding with her infant within the first twelve months (Else-Quest, 2003). As breastfeeding is considered an integral component of infant and maternal health, the decrease in breastfeeding by women impacted by anxiety is troubling. Though antenatal anxiety is a common experience among pregnant women and can result in negative outcomes if left untreated, it has been less researched compared to antenatal depression, which has a similar prevalence (Grigoriadis et al., 2018). Furthermore, antenatal anxiety has been found to be a strong predictor of postpartum depression if left untreated (Austin et al., 2007).

3. *Depression*

3.1 Depression Defined

Major Depressive Disorder (MDD) is mood disorder characterized by persistent feelings of sadness and loss of interest (American Psychiatric Association, 2013). The DSM-5 requires that five or more symptoms are present during a two-week period with at least one of the symptoms being a depressed mood or loss of interest or pleasure (American Psychiatric Association, 2013). Such additional symptoms include significant weight loss or weight gain, and fatigue or loss of energy nearly every day, disturbed sleep, feeling of worthlessness or helplessness, difficulty concentrating, and potential suicidality (American Psychiatric Association, 2013).

The lifetime prevalence of major depressive disorder is approximately 16 % (Kessler et al., 2005). Studies have shown that women are affected by Major Depressive Disorder (MDD) at higher rates than men. Women have a greater lifetime prevalence of MDD compared to men with 7.2% of women developing MDD in their lifetime (Picco et al., 2017). The economic burden of MDD rose by 21.5% between 2005 and 2010, and it is estimated to have a total cost of $210.5 billion dollars (Greenburg et al., 2015).

3.2. Depression and Pregnancy

Perinatal depression includes major and minor depressive episodes, occurring during pregnancy or within the first year following delivery (Gavin et al., 2005). Major Depressive Disorder is the most common mental health condition that affects pregnant women (Shidhaye & Giri, 2014). Approximately 7 to 13% of pregnant women are affected by perinatal depression (Gavin et al., 2005). For women who have a pre-pregnancy mental health diagnosis, this prevalence increases to 46% (Katon, 2017). Risk factors associated with antenatal depression include living in a rural setting, decreased marital satisfaction, assisted reproductive technology, lacking prenatal health knowledge, and stressful life events (Chen et al, 2019).

Antenatal depression has been shown to have several negative effects on pregnancy outcomes. For example, antenatal depression has been identified as a potential risk factor for pregnancy complications such as spontaneous abortion (Nakano et al., 2004) and pre-eclampsia (Qui et al., 2007). In a study by Qui et

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al., (2007) approximately 700 pregnant were evaluated for depressive symptoms during pregnancy with the Patient Health Questionnaire. Findings demonstrated that women with moderate depressive symptoms had a 2.3-fold increase of preeclampsia compared to non-depressed pregnant women, while women with moderate-severe depressive symptoms were associated with a 3.2-fold increase. Additionally, Infants with depressed mothers are more likely to have a premature birth (Diego et al., 2009; Smith et al., 2010).

Low birth weight has also been associated with antenatal depression (Field et al., 2004; Smith et al., 2010; Diego et al., 2009). A study by Diego and colleagues examined eighty pregnant women, forty of them being depressed and forty being non-depressed. The depressed women had a 13% greater instance of premature birth than the non-pregnant cohort (Diego et al., 2009). Furthermore, the depressed women had a 15% greater incidence of delivering a child with a low birthweight compared to the non-pregnant cohort (Diego et al., 2009). Low birthweight is concerning, because low birthweight is a leading cause of fetal morbidity and mortality (Miniño et a., 2006). As illustrated, antenatal depression can have serious consequences for both mother and child.

4. *Anxiety and Depression during Pregnancy*

Studies have found that Anxiety and Depression are highly comorbid (Bitsika & Sharpley, 2012; Slade et al., 2007). In a sample of Australian university students, Bitsika and Sharpley (2012) found that the incidence of

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comorbid anxiety and depression was four times greater than anxiety or depression alone (Bitsika & Sharpley, 2012). The Zung Self-rating Anxiety Sale and the Zung Self-rating Depression Scale were used (Bitsika & Sharpley, 2012).

The risk factors for Antenatal Anxiety and Depression were found to be similar in a cross-sectional study by the Department of Gynecology at Mamji Hospital in Pakistan. Researchers administered different questionnaires to pregnant women (n=520) including the Hospital Anxiety and Depression Scale (Rabia et al., 2017). Findings from this study identified the following risk factors to be associated with both antenatal anxiety and depression: being a working woman, domestic violence, difficult relationships with in-laws, sleep disturbances, primigravida (first time pregnancy), and unplanned pregnancy (Rabia et al., 2017). Additional risk factors for the depression group only were having a poor relationship with one's husband, the occurrence of a stressful life event in the previous year, and tertiary education (Rabia et al., 2017). These findings suggest that certain factors put women at risk of both anxiety and depression during their pregnancy.

Both anxiety and depression have been associated with increased health care use. In a study by Andersson et al. (2004), nearly 1500 women were surveyed to compare obstetric outcomes and health care usage of pregnant women in Northern Sweden. Findings identified significant associations between depression and anxiety and increased nausea and vomiting, prolonged sick leave during pregnancy and increased number of visits to the obstetrician, especially visits related to fear of childbirth and those related to contractions

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(Andersson et al., 2004). Antenatal anxiety and depression also were significantly associated with increased cesarean delivery and epidural analgesia during labor (Andersson et al., 2004). This study suggests that pregnant women suffering from anxiety and depression have higher rates of complications and health care use than women without these conditions.

Less is known regarding the effects of comorbid anxiety and depression on pregnant women and the neonate. A study by Field and colleagues (2010) examined the anxiety and depression comorbidity in pregnant women. Over 900 women were recruited during their second trimester and separated in to the non-depressed, anxiety disorder, depressive disorder, or comorbid anxiety-depressive disorder group based on the Structural Clinical Interview for DSM-IV Disorders. Results suggested that the comorbid group (anxiety and depression) reported higher levels of anxiety, anger, and daily hassles compared to the other groups (Field et al., 2010). The comorbid group also reported having more sleep disturbances and relationship problems (Field et al., 2010). Interestingly, the comorbid group did not report having higher levels of depression when compared to the depression only group (Field et al., 2010). Neonates of the comorbid group had a greater incidence of prematurity (Field et al., 2010). Though further research is needed, these effects of comorbid anxiety and depression on pregnant women and neonates are concerning.

5. *Socioeconomic Status*

5.1 Socioeconomic Status and Health

Socioeconomic status has been found to negatively contribute to health in many respects. A study in Tennessee found that influenza hospitalization was associated with lower neighborhood socioeconomic status (Sloan et al., 2015). Socioeconomic status is also a strong predictor of obesity (Best & Papies, 2019). A large scale online study by Best and Papies (2019) examined how much individuals intended to consume from small and large portions of unhealthy and healthy snacks. Individuals of lower socioeconomic status endorsed intentions to eat more from the larger portions of unhealthy snacks compared to the smaller portions, equating an increased energy impact of 15-22% (Best & Papies, 2019). Cancer incidence and outcomes have been associated with socioeconomic status. A study, which examined over 10,000 individuals from the Eastern Anglian Cancer Registry, found that women of lower socioeconomic status were associated with greater risk of death from breast cancer (Kaffashian et al., 2003). In a pooled analysis of twelve case-controlled studies from Europe and Canada, Hovanec and colleagues (2018) identified a link between lung cancer and low socioeconomic status.

The effects of socioeconomic status have greater associations with the health of women whereas they are less associated with the health of men. Income has been negatively correlated with prevalence of obesity in women, but not in men (Ogden et al., 2010), and a study in Switzerland found that low

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socioeconomic status and income reduction were significantly associated with anxiety disorders in women, but not with men (Mwinyi et al., 2017).

5.2 Socioeconomic Status and Anxiety and Depression during Pregnancy

Though few studies regarding anxiety and depression during pregnancy have included women from low socioeconomic status (Lobel et al., 1992), literature has demonstrated that socioeconomic status plays a role in the severity at which pregnant women experience anxiety and depression (Arora & Aeri, 2019; Field et al., 2008; Shagufta & Shams, 2019). A study by Field and colleagues (2008) examined over 800 pregnant women diagnosed with major depressive disorder by the Center for Epidemiological Studies Depression scale and the Structured Clinical Interview for Depression, revealed that depressed pregnant women were more likely to be of lower socioeconomic status (Field et al., 2008). This suggests the low socioeconomic status contributes to depressive symptoms in pregnant women.

Low socioeconomic status has also been significantly linked to anxiety during pregnancy (Shugufta & Shams, 2019). A study that examined Hispanic and African American pregnant women of middle and low socioeconomic status found that low socioeconomic group had higher anxiety scores when measured by the Profile of Mood States (Field et al., 2002). A study examining women's emotional changes throughout their pregnancy found that socioeconomic level played a role in the severity at which the anxiety and emotional distress were experienced, as measured by the Repression Sensitization scale (Rofé et al.,

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1993). Low socioeconomic status may be a factor that contributes to increased anxiety during pregnancy.

6. *Present Study and Hypothesis*

Based on previous literature, the present study aimed to identify associations between anxiety and depression, and socioeconomic status in pregnant women. The following hypotheses were examined.

1. Pregnant women with a lower household income will have higher anxiety symptoms compared to pregnant women with higher income levels.

2. Pregnant women with a lower household income will have higher depressive symptoms compared to pregnant women with higher income levels.

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Methodology

1. Methods

      The participants consisted of 557 pregnant women visiting an OBGYN Clinic in north Mississippi. Ages ranged from 18 - 45 with the mean age of the women being 28.42. The ethnic breakdown of the women was as follows: 77.4% white, 19.4% African American, 1.7% Multiracial, 1.3% Asian, and 0.2% Native American. The household income breakdown was as follows: 10.4% earned less than $10,000, 10.7% earned $10,000 to $20,000, 11.9% earned $21,000 to $30,000, 23.7% earned $31,000 to $50,000, 28.9% earned $51,000 to $100,000, and 14.4% earned greater than $100,000. Potential participants were approached in the waiting room of the clinic, and they were asked if they would like to participate in a study being conducted at The University of Mississippi that was observing metal and physical health throughout pregnancy and the post-partum period. Women who consented were given a demographic questionnaire and self-report measures to complete.

2. Measures

2.1 Depression, Anxiety, and Stress Scale-21

      The Depression, Anxiety, and Stress Scale (DASS-21; Lovibond & Lovibond, 1995) is a self-report measure that assesses symptoms of depression, anxiety, and stress over the past week. The scale consists of twenty-one

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statements that are assigned rating of zero to three. A score of zero indicates that the statement "did not apply…at all" and a score of three indicated that the statement "applied…very much or more of the time." The scores are added, and symptoms of depression, anxiety, and stress are categorized into severity ranges from "normal" to "extremely severe." Only the depression and anxiety subscales were used for this study.

2.2 Edinburgh Postnatal Depression Scale

The Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, Sagovsky, 1987) is a self-report measure optimized for assessing symptoms of depression in pregnant and postpartum women. Women are asked to report responses that most closely match their feelings over the previous seven days. The scale consists of ten statements with four selectable responses. The four responses range from the statement being never accurate to an individual or frequently accurate. The maximum score is thirty and possible depression is classified as a score of ten or greater.

1. *Symptoms of anxiety will be negatively correlated with socioeconomic status in pregnant women.*

   Results from a One-Way ANOVA demonstrated significant differences among income levels for anxiety, as measured by the DASS-21 anxiety subscale ($F[5, 473] = 5.92$, $p < .001$, $\eta_2 = .06$). Post-hoc analyses were run using Tukey HSD. Women who reported household income of less than $10,000 per year reported significantly more anxiety symptoms than women in the $51,000 to $100,000 ($p <.001$) and greater than $100,000 income brackets ($p = .003$). Additionally, women who reported household income of $31,000 to $50,000 per year also reported significantly more anxiety symptoms than women in the $51,000 to $100,00 ($p = .002$) and greater than $100,000 income brackets ($p = .003$). No other income brackets significantly differed from each other (ps $> .05$)

2. *Symptoms of depression will be negatively correlated with socioeconomic status in pregnant women.*

   Results from a One-Way ANOVA illustrated significant differences among income levels for depression, as measured by the EPDS ($F[5, 473] = 6.98$, $p < .001$, $\eta_2 = .07$) and DASS-21 depression subscale ($F[5, 473] = 7.23$, $p < .001$, $\eta_2 = .07$). Post-hoc analyses were run using Tukey HSD. Specifically using the EPDS, women who reported an income of less than $10,000 per year reported significantly more symptoms of depression that women in all other income

brackets (ps < .001 - .05). No other income brackets significantly differed from each other (ps > .05). On the DASS-21 depression subscale, women who reported a household income of less than $10,000 per year reported significantly more symptoms of depression than women in the $51,000 to $100,00 (p < .001) and greater than $100,000 income brackets (p = .04). Additionally, women who reported an income of $31,000 to $50,000 per year reported significantly more anxiety symptoms than women in the $51,000 to $100,00 (p = .003) and greater than $100,000 income brackets (p = .008). No other income brackets significantly differed from each other (ps > .05)

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Symptoms of anxiety and depression are prevalent among pregnant women (Dennis et al., 2017; Shidhaye & Giri, 2014), and previous literature has suggested that women of low socioeconomic status are at a greater risk of experiencing anxiety and depression during pregnancy (Arora & Aeri, 2019; Field et al., 2008; Shagufta & Shams, 2019). The purpose of the present study was to assess the relationship between household income and anxiety, in a sample of pregnant women in Mississippi.

Congruent with global literature, data revealed that women in Mississippi with lower household incomes had higher a higher mean score on anxiety and depression self-report measures. Though differences between income groups above $10,000 on the EPDS were not significant, the mean score decreased as the income bracket increased. Additionally, the mean score of the women in the less than $10,000 group was 10.52, which qualifies for possible depression on the EPDS. This suggests that, on average, women in the lowest income group were depressed. A similar trend occurred in the DASS-21 anxiety and depression scales with the exception of the $31,000 to $50,000 income group. Differences between the $31,000 to $50,000 group and the less than $10,000 group were not significant; however, they were significantly different than the $51,000 to $100,00 and greater than $100,000 income brackets. This suggests that as income increases, symptoms of anxiety and depression decrease with a spike in

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symptoms as the subject nears, but does not enter, the higher income range. Though these women are likely able to meet their day-to-day needs, they may be experiencing other stressors that are resulting in higher levels of anxiety and depression. The mean score of the women in the less than $10,000 bracket placed these women in the moderate range of the DASS-21 anxiety and depression subscales (M = 8.87, 7.17). The mean score of the women in the $31,000 to $50,000 income bracket was in the moderate and mild range of the DASS-21 anxiety and depression subscales respectively (M = 7.66, 5.24). Depressive symptoms in all other income brackets fell within the "normal" range for and in the mild range of the anxiety. This suggests that as income increases, on average symptoms of depression are absent and symptoms of an anxiety are mild. Overall, these results aligned with previous literature regarding associations between anxiety and depression and socioeconomic status (Arora & Aeri, 2019; Field et al., 2008; Shagufta & Shams, 2019)

These findings suggest that pregnant women of low socioeconomic status may be preoccupied by concerns related to motherhood, including additional expenses, access to prenatal care, and maternity leave. For example, the anticipated expenses that incur from raising a child, may be an additional stressor during the perinatal period that could impact the development of anxiety and depression. According to the United States Department of Agriculture, single parent and married couple households that earn below $59,200 in 2015 dollars spend on average $172, 200 and $174,690 per child up to age eighteen respectively (Lino et al., 2017). For single-parent households that earn under $59,200, they spend, on average, $9,090 annually to raise an infant (Lino et al., 2017). Pregnant women of low socioeconomic status may be concerned about their ability to provide for

their child; therefore, they experience symptoms of anxiety and depression at a greater rate.

Additionally, pregnant women of low socioeconomic status may be concerned about their access to prenatal care, which may be limited by their income. Pregnant women classified as having low socioeconomic status receive inadequate prenatal care at higher rates than their middle and high socioeconomic status counterparts (Kim et al., 2018), and low socioeconomic status has been associated with increased risk of preeclampsia, gestational diabetes, and other obstetric complications (Kim et al., 2018). This suggests that prenatal care is of vital importance to pregnant women of low socioeconomic status, who may need additional support throughout their pregnancy. Furthermore, anxiety and depression during pregnancy have been associated with low birth weight, increased cesarean delivery, and epidural analgesia during labor (Andersson et al., 2004; Field et al., 2003; Smith et al., 2010; Diego et al., 2009). Given the associations between low socioeconomic status and symptoms of anxiety and depression that both previous literature (Arora & Aeri, 2019; Field et al., 2008; Shagufta & Shams, 2019) and the present study have identified in pregnant women, potential complications due to anxiety and depression must also be considered.

Also, because the United States has no national policy that guarantees paid maternity leave (WORLD Policy Analysis Center, 2015), pregnant women with a low income may worry about the impact of unpaid maternity leave on their livelihood. Many may not be able to afford to take any leave after the birth of the child. A family and medical leave report in 2012, documented that 2.8 million workers in the United States did not take family or medical leave due to financial concerns (Klernman et al., 2014).

Pregnant women with low socioeconomic status may struggle with the choice to continue working despite missing valuable time to bond with their baby (Rossin, 2011) or take maternity leave and forfeit their income.

Impacts of socioeconomic status on health are particularly concerning to the state of Mississippi. Mississippi has the lowest median household income and the highest poverty rate in the United States with a median household income of $43,567 (in 2018 dollars) and a poverty rate of 19.7% (United States Census Bureau, 2018). The median household income of the state falls within the $31,000 to $50,000 income group of the present study. When assessed by the DASS-21 anxiety and depression subscales, this group had significantly higher mean anxiety and depression scores than the two highest income groups and no significant difference in symptoms when compared to the group that earned less than $10,000. With a large proportion of the population experiencing poverty and low income, identifying the impacts of these experiences is crucial for providing relief to this vulnerable population.

Limitations

The present study had many strengths, including the large sample size and demographic location of the participants. Research addressing women's mental health during pregnancy is limited, especially among women in the South United States. Though the present study had its strengths, there were limitations. For instance, the study was limited by the use of self-report measures to collect the data. Though the self-report measures used are psychometrically valid, they are only capable of assessing symptoms. They cannot render a diagnosis. If a clinical interview were performed, a true diagnosis

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could be made that could more directly tie socioeconomic status to the experience of anxiety and depression during pregnancy. Additional research that utilizes clinical interviews to directly diagnose the participants could further validate the results of the present study.

Although the study included a novel sample of pregnant women from the South United States, the ethnic makeup of the participants was a limitation. Participants were 77.4% white, thus, the data may not be generalizable to a more racially heterogeneous population. Studies that examine pregnant women of a variety of racial and cultural backgrounds will need to be conducted to determine the current study's generalizability.

Because women elected to participate in the study, a selection bias may have been at play. Perhaps women that were experiencing symptoms of anxiety and depression felt more compelled to participate in the study than women with no symptoms. Recruiting women in a different manner than the present study (approaching women in the waiting room) could lessen potential selection biases at play either on the part of the participant or the research assistant.

Additionally, although the study utilized a large sample size, the Levene's test was significant (ps = .001); therefore, the homogeneity assumption was violated. This was likely due to unequal sample sizes of the income groups. A Levene's test is used to determine if the amount of variance in each sample is approximately equal. The null hypothesis of this test is that the group variance is equal or not significant ($p > .05$). Future studies with equal sample sizes may resolve the unequal levels of variance.

Future Directions

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With high rates of anxiety and depression (Dennis et al., 2017; Shidhaye & Giri, 2014) in the pregnant population, mental health screenings for all patients in an OB/GYN setting is a standard that practitioners should aspire to. The American College of Obstetricians and Gynecologists (2018) recommends that physicians screen patients at least once for anxiety and depression during the perinatal period. A literature review by O'Connor and colleagues (2016) evaluated studies concerning the screening of pregnant and postpartum women for depressive symptoms. The results of this study indicate that pregnant and postpartum women that were screened for depression saw reduced prevalence of depression, even without additional treatment-related support (O'Conner et al., 2016). This emphasizes the importance of screening in not only identifying women experiencing mental health problems during pregnancy, but also reducing adverse mental health symptoms.

Screening for the anxiety and depression throughout pregnancy and discussing the potential impact of symptoms could allow physicians and other health professionals to potentially mitigate the harms that anxiety and depression can pose to both the mother and her child. Intervention for expectant mothers at risk for anxiety and depression has shown efficacy in reducing adverse birth outcomes (Feinberg et al., 2016). Feinberg and colleagues (2016) examined the impact of Family Foundations, a parenthood transition program, on birth outcomes (birth weight and length of postpartum hospital stay) in a randomized study with 259 expectant mothers. Family Foundations is a psycho-educational education program for first time parents that focuses on parental emotional self-management and conflict resolution skills (Feinberg et al., 2016). Expectant mothers that participated in the study self-reported some or all of the following mental health

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problems: financial stress, depression, and anxiety (Feinberg et al., 2016). The study found that participation in the program had a significant moderated intervention effect on birthweight by economic strain and depression (Feinberg et al., 2016). Additionally, the study found that program participation had a significant moderated intervention effect on maternal length of stay and economic strain (Feinberg et al., 2016). These results indicate that intervention can play an integral role in reducing the adverse effects that maternal health problems can pose to both mother and child.

Worrisomely, women who experience mental health troubles during the perinatal period often do not seek help (Fonseca, 2015). In a cross-sectional internal survey, 656 pregnant or recently pregnant (within the last twelve months) women were assessed by the Edinburgh Postpartum Depression Scale and questioned about their help seeking behavior and perceived barriers to help-seeking (Fonseca, 2015). Only 13.6% of the women with symptoms of depressive women sought help and particularly identified knowledge barriers as a barrier to help-seeking (Fonseca, 2015). This study underscores the importance of mental health screening during pregnancy by practitioners to alleviate barriers to help-seeking. If women with anxiety or depression are screened during prenatal care, they may be more likely to seek help for their symptoms. Given that the present study found a link between low socioeconomic status and symptoms of anxiety and depression, screening for women in this population is critical to ameliorate these symptoms.

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Conclusion

Mental health plays a critical role in a woman's health before, during, and after pregnancy. The results of the present study indicate that the risk of anxiety and depression may be elevated in pregnant women of low socioeconomic status; therefore, practitioners should take socioeconomic status into consideration when evaluating their patient's risk for developing anxiety and depression during their pregnancy. Implementing such screening for pregnant women is vital for ensuring both a healthy mother and healthy baby.

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Table 1. Mean Score of Family Income Brackets on EPDS, DASS-21 Depression, and

DASS-21 Anxiety

	Sample Size	EPDS M (SD)	DASS-21 Depression M (SD)	DASS-21 Anxiety M (SD)
Less than $10,000	46	10.52 (6.58)	7.17 (8.53)	8.87 (7.95)
$10,000 to $20,000	48	7.50 (5.55)	4.00 (5.81)	5.38 (8.00)
$21,000 to $30,000	53	7.49 (5.56)	3.85 (5.88)	5.89 (5.98)
$31,000 to $50,000	116	7.56 (5.61)	5.24 (5.94)	7.66 (7.22)
$51,000 to $100,000	139	5.83 (4.03)	2.94 (3.62)	4.62 (4.99)
Greater than $100,000	72	5.86 (4.38)	2.28 (2.93)	4.42 (4.14)

Note. M = Mean; *SD* = Standard Deviation; DASS-21 = Depression, Anxiety, and Stress
Scale; EPDS = Edinburgh Postnatal Depression Scale