PREDICTORS AND CORRELATES OF ANXIETY IN WOMEN

HOSPITALIZED WITH HIGH-RISK PREGNANCY

APPROVED BY SUPERVISORY COMMITTEE

H.M. Evans, Ph.D.

Sandra Pitts, Ph.D.

Richard Robinson, Ph.D.

Anna Stowell, Ph.D.

C. Allen Stringer, M.D.

DEDICATION

I dedicate this dissertation to my wonderfully supportive and loving husband,

Marc Labat, M.D.

PREDICTORS AND CORRELATES OF ANXIETY IN WOMEN HOSPITALIZED WITH HIGH-RISK PREGNANCY

by

DANA BROUSSARD LABAT

DISSERTATION

Presented to the Faculty of the Graduate School of Biomedical Sciences

The University of Texas Southwestern Medical Center at Dallas

In Partial Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

The University of Texas Southwestern Medical Center at Dallas

Dallas, Texas

August, 2007

ACKNOWLEDGEMENTS

I could not have accomplished this original research without the guidance, expertise, thoughtfulness, and well-wishes of many individuals. I, first, would like to thank my committee members: Drs. Monty Evans, Sandra Pitts, Richard Robinson, Anna Stowell, and C. Allen Stringer. These individuals offered a wide range of support throughout the research and writing phases of this investigation.

Dr. Monty Evans, my dissertation chair, welcomed me with open arms to the ongoing project at Baylor University Medical Center. I sought his guidance and with his support, ventured into a new and exciting realm of women's psychological health. Dr. Stringer graciously allowed our research team access to our population base and provided us with office accommodations, as well. Dr. Stowell provided me with invaluable and meticulous feedback on the nuances of technical writing and often reviewed my work without hesitation. Dr. Robinson ensured that I had full grasp of the statistical element of this project and could clearly articulate my findings in a way that proved to be both a true contribution to the literature and an exciting foundation for future research. Dr. Pitts offered her "mighty red pen" on many occasions and often encouraged me to step away from my research in order to regain clarity when getting overwhelmed by the minutia.

I am indebted to my dear friends and colleagues on this project, Paula Miltenberger and Jamie Rifkin. Paula and I became close during the first year of our doctoral program. Her insight, wit, and true friendship during our matriculation through the program and in our mutual research tribulations often kept me grounded and reminded me to maintain perspective. Jamie has also given me continued support, friendship, and insight. Our bond grew stronger during this last year as we worked on our collaborative dissertation projects and co-facilitated a Southwest Clinic Group. Jamie often met me in the morning weekend hours at Baylor to code data and review files. Even though we became weary at various points in this process, we were able to lean on each other, learn from each other, and provide mutual and continuous encouragement.

Other classmates have been instrumental in helping me maintain sanity and a positive outlook throughout the past four years. I offer my sincere thanks to Gabby Oroza, Roger Perez, Albert Banta, and Christine Holberg for their humor, commiseration, and empathy during our many transitions throughout our doctoral training. I wish all of my classmates the best of luck in their future endeavors.

I am grateful to several of my supervisors, Drs. Steve Krebaum, Andy McGarrahan, Ted Asay, Deanna Liss, and Ms. Gayle Marshall for being particularly instrumental in my growth and development as a psychologist. These remarkable individuals are incredibly knowledgeable and insightful, and they instilled in me a desire to delve deeper into the psyche. Additionally, Dr. Berit

Johnson encouraged me to look within, push myself both personally and professionally, and find ways to “de-stress.”

Finally, I would not be where I am today without the love and support of my family. My husband, Marc, was not only instrumental in encouraging me to return to school and pursue my dream of becoming a psychologist, but also took that leap of faith with me as we packed our bags and headed to Dallas four years ago. He has been a source of strength, love, friendship, and unending encouragement for me. My parents, brother, and sister also cheered me along the way, listened to my tales of woe, and pushed me to challenge myself. Countless other friends and family have traveled this journey with me. For them and all of whom I have mentioned, I thank you tremendously.

PREDICTORS AND CORRELATES OF ANXIETY IN WOMEN HOSPITALIZED WITH HIGH-RISK PREGNANCY

Publication No. _____

Dana Broussard Labat, Ph.D.

The University of Texas Southwestern Medical Center at Dallas, 2007

Supervising Professor: H. M. Evans, Ph.D.

Anxiety during pregnancy often negatively impacts a woman's perception of her pregnancy, as well as affects the development of the fetus and contributes to long-term negative sequelae during subsequent years post-delivery. Despite the increases in attention to the effects of anxiety in the perinatal literature, few studies utilize women with high-risk pregnancy as their population of study. These women would appear to be at a greater risk of experiencing anxiety because of the physical and psychological demands of their complicated pregnancies. Therefore, the current study attempted to determine the

demographic and psychosocial correlates of anxiety in this unique population. This investigation also sought to improve significant methodological limitations found in previous published reports by employing a "gold standard" clinical diagnostic interview in addition to self-report measures of anxiety. Finally, this study examined the course of anxiety across hospitalization. From October 2005 to December 2006, 129 participants admitted to a high-risk antenatal unit participated in this investigation. Of those participants, 12% were diagnosed with an anxiety disorder. This prospective investigation revealed significant associations among anxiety symptoms and younger maternal age, lower education and income level, and Medicaid insurance status. Further multivariate analyses revealed that relationship maladjustment, greater number of and elevated perceived distress of stressful life events, and the consideration of termination were also significantly associated with the presence of anxiety symptoms. Logistic regression analyses determined that endorsed depressive symptoms predicted more than a one-and-a-half time's likelihood of increased anxiety symptoms. These findings show that anxiety symptoms are present in women hospitalized with high-risk pregnancy and directly impact the experience of pregnancy. These results demonstrate that identifying potential risk factors of anxiety through routine screenings at initial admission could lead to the development of hospital-based short-term interventions aimed at preventing

negative antenatal and postpartum outcomes.

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LIST OF ABBREVIATIONS AND DEFINITIONS

Abbreviations

ALSPAC	Avon Longitudinal Study of Parents and Children
ANRQ	Antenatal Risk Questionnaire
CES-D	Center for Epidemiological Studies - Depression Scale
DAS	Dyadic Adjustment Scale
DSM-IV-TR	The Diagnostic Statistical Manual of Psychiatric Disorders-Fourth Edition, Text Revision
EPDS	Edinburgh Postnatal Depression Scale
HADS	Hospital Anxiety and Depression Rating Scale
LES	Life Events Scale
LESFOG	Life Events Scale for Obstetric Groups
PES	Pregnancy Experiences Scale
PRIME-MD	The Primary Care Evaluation of Mental Disorders
STAI	Spielberger State-Trait Anxiety Inventory
SCID	Structured Clinical Interview for the DSM-IV

Definitions

Antenatal	Pertaining to period before birth; pregnancy period
Antepartum	Pertaining to period before birth; pregnancy period
Multipara(s)	Has had previous live births
Nulliparous	No previous childbirth

Parity	Number of previous live births
Parturition	The process of giving birth to an offspring
Perinatal	Occurring in, concerned with, or being in the period around the time of birth
Pregravid	Pregnant
Prevalence	The percentage of the population with a condition at a specified time period
Primipara(s)	Expectant with first pregnancy
Primiparous	Bearing first offspring
Puerperium	Period between childbirth and the uterus return to normal

CHAPTER ONE

Introduction

Almost a decade ago, the Surgeon General's Report on Mental Health revealed that the one-year prevalence rates for all anxiety disorders surpassed 16% among adults 18 to 54 years of age in the United States alone, with women being at a significantly higher risk than men (APA, 2000; DHHS, 1999). Given that women often do not seek treatment for their anxiety symptoms, the reported prevalence rates may be markedly underestimated. Additionally, "Psychiatric disorders, particularly mood and anxiety disorders, have the highest prevalence in women during the childbearing years" (Cott & Wisner, 2003, p. 217).

Some research suggests that anxiety disorders are even more prevalent than depression (Brockington, Macdonald & Wainscott, 2006; de Graaf, Bijl, Spijker, Beekman & Vollebergh, 2003), warranting increased focus by the research community. Antenatal and postpartum depression has received widespread attention from the psychological, medical, and nursing communities, with antenatal anxiety being empirically linked to postpartum depression (Heron, O'Connor, Evans, Golding & Glover, 2004). Investigating the presence of anxiety disorders during the perinatal period, however, has been slower to gain attention (Coleman, Morgan, Zinbert & Schulkin, 2005). While the need for research in antenatal anxiety has gained recognition, several reviews discovered that too few

well-controlled studies exist in the literature (Austin & Priest, 2005; Coleman et al., 2005).

For instance, less attention has been given to screening for anxiety symptoms and associated anxiety disorders in comparison to evaluating depression during the antenatal and postpartum periods. Additionally, only a scant number of studies in the perinatal literature have attempted to determine prevalence rates of specific anxiety disorders in an obstetrics population (Levine, Oandasan, Primeau & Berenson, 2003). Of those studies, limited generalizability exists because of methodological variances including the use of inconsistent operational definitions of anxiety and assessment of expectant mothers at differing stages of pregnancy (Canivet, Östergren, Rosén, Jakobsson & Hagander, 2005; Johnson & Slade, 2003).

Most existing investigations of antenatal anxiety have concentrated on childhood outcomes, demonstrating that children who were exposed to maternal stress in utero experienced psychological and physiological abnormalities. Specifically, research has highlighted the effect of maternal antenatal anxiety on infantile colic (Canivet et al., 2005); impulsivity and ADHD (Van den Bergh & Marcoen, 2004; Van den Bergh et al., 2006); atypical handedness in the child (Glover, O'Connor, Heron, Golding & ALSPAC, 2004); fetal neuroendocrine development (Neumann, Kromer & Bosch, 2005); and disruptions in fetal

neurobehavioral responses to maternal stress (DiPietro, Costigan & Gurewitsch, 2003).

An emerging interest is the direct influence of anxiety on the mother and her fetus. Recent investigations of the impact of anxiety on the expectant mother and fetus have shown that the mother's physiological response to anxiety can serve to decrease blood flow to the uterus, leading to growth retardation of the fetus, impaired development of fetal systems (Canivet et al., 2005; Mancuso, Schetter, Rini, Roesch & Hobel, 2004; Teixeira, Fisk & Glover, 1999) and suppression of motor activity in the womb (DiPietro et al., 2003). Consequently, the impact of maternal anxiety has far reaching effects on both the health of the expectant mother and of her growing fetus.

Notably, the aforementioned studies focused on anxiety in the typical pregnancy, but very few compared the emotional experience of women with obstetric complications, typically identified as "high-risk", to those with no obstetric risk factors (Brisch et al., 2002; Heaman & Gupton, 1998). These women, the focus of the current examination, remain empirically understudied with regard to anxiety symptoms and delivery outcomes.

Healthcare professionals often require hospitalization to closely monitor obstetrically complicated pregnancies, creating its own set of stressors, such as being away from one's family, loss of mobility, and fears associated with maternal and fetal health. Plausibly, a subset of these women likely suffers from

anxiety, depression, or both. In the United States alone, more than 800,000 women are diagnosed and treated for obstetric complications during pregnancy every year (Martin et al., 2006). Approximately 10.5 pregnant women per 100 deliveries were hospitalized antenatally between 1999 and 2000 because of pregnancy-related complications (Bacak, Callaghan, Dietz & Crouse, 2005).

With the known negative sequelae of psychological distress during pregnancy, conducting antenatal screenings of high-risk pregnant mothers for anxiety symptoms and anxiety disorders seems essential. Austin (2004) highlights this point, as she draws attention to the need to examine the effects of distress throughout the perinatal period – defined as the period from "pregnancy to the first year postpartum" – in order to fully attend to the psychological process during this stage in a woman's life (Austin, 2004, p. 1).

In light of the limited research on the course of anxiety and predisposing risk factors in hospitalized women with high-risk pregnancies, this investigation will examine the occurrence and course of anxiety symptoms and anxiety disorders in this diverse pregnancy population. It also creates a predictive model to determine biopsychosocial risk factors associated with anxiety symptoms and anxiety disorders in a sample of women hospitalized with high-risk pregnancy. Factors to be examined include demographic variables such as age, ethnicity, and number of previous pregnancies; psychological factors including life event stress, relationship adjustment, and pregnancy intendedness; and biological factors such

as the number of obstetric complications. By using the Structured Clinical Interview for the DSM-IV (First et al., 2002), considered to be the "gold-standard" diagnostic measurement, to assess the course of anxiety, this study can improve upon our detection of anxiety and more accurately evaluate its potential impact on delivery outcomes.

CHAPTER TWO

Review of Literature

Physiology of Anxiety

According to the 1999 Surgeon General's Report (DHHS, 1999), theories relating to the etiology of anxiety responses and anxiety disorders have progressed beyond the utility of employing a model based only on the acute stress response. Several studies posit that anxiety itself differs from the response one may have when in direct contact with a fear-producing stimulus since one does not have to actually encounter such a stimulus to experience anxiety (DHHS, 1999). Therefore, the anticipation of a future stimulus, even in its absence, can trigger an anxiety response. Usually, the anxiety response is situationally-bound and tends to dissipate when the exposure ends (Coleman et al., 2005). Some individuals, however, experience a heightened and frequent response to the anticipation of a fear-provoking stimulus. In this instance, the chronic nature of frequent anxiety responses can eventually result in significant negative consequences (Neumann et al., 2005). Mancuso and colleagues (2004) note that "…anxious individuals are believed to be in a perpetually anticipatory state, potentially resulting in greater wear and tear on the body" (p. 763).

Anxiety and the HPA Axis

Various fields have begun to elucidate the processes and potential causes

of the anxiety response, as well as the effects of chronic anxiety on the body. Extensive medical and psychological research shows that the hypothalamic-pituitary-adrenacortical axis (HPA axis) is significantly involved in the development and exacerbation of the anxiety response, as it serves as the neurobiological mediator in the response to stress or anxiety-producing stimuli (Mancuso et al., 2004; Neumann et al., 2005). The HPA axis functions by receiving sensory information through the amygdala, which projects to the hypothalamus, activating the sympathetic nervous system, and then leads to the production of corticotropin-releasing hormone (CRH; Leonard, 2005; Mancuso et al., 2004). The release of CRH signals the production of adrenocorticotropin (ACTH) hormone from the pituitary gland, prompting the production and release of glucocorticoids (e.g. cortisol) from the adrenal cortex, thus enacting the "fight-or-flight" response.

Physiology of anxiety in pregnancy.

Research originally utilized animal models when examining the HPA axis' function during pregnancy, which broadened understanding of the anxiety process during the pregnancy and postpartum periods (Maccari et al., 2003; Neumann et al., 2005; O'Connor et al., 2005; Tambyrajia & Mongelli, 2000). Mulder and colleagues (2002) demonstrated that long-term effects of HPA dysregulation, as caused by anxiety-inducing stimuli, negatively impacted parenting behavior and

heightened arousal among pregnant rats. This finding was supported by additional research (Neumann et al., 2005).

More recently, several studies have elucidated the neurobiological processes of anxiety associated in pregnant women (O'Connor et al., 2005; Teixeira, Fisk & Glover, 1999). Notably, pregnancy has been shown to have greater sympathetic and reduced parasympathetic modulation in the central nervous system as the pregnancy approaches term (DiPietro et al., 2005; Mancuso et al., 2004; Wadhwa, Sandman, Chicz-DeMet & Porto, 1997). Additionally, hormonal changes that can significantly impact a woman's mood have been directly related to physiological changes in pregnancy (Halbreich, 2005; Teixeira et al., 1999). Mulder and colleagues (2002) acknowledge that the physiological response to anxiety is unique to each pregravid woman; therefore, the compounding effect of environmental factors leading to a pregnant woman's increased vulnerability of developing anxiety symptoms should be considered:

> Individuals may respond differently to an identical stress stimulus. The degree of the stress response depends also on genetic factors, personality characteristics, previous experience, support from the social environment, and the way of coping with stress. This applies to pregnant women, as well. (p. 5)

Physiology of anxiety within the uterine environment.

Heightened HPA activity, as signaled by stress, could prematurely impact fetal development through the interaction of cortisol production in the placenta and fetal HPA activity:

> Overproduction and hypersecretion of fetal cortisol thus may arise from maternal cortisol in the fetal compartment and/or from pCRH secretion. Increased fetal cortisol (of maternal or fetal origin) may inhibit growth and differentiation of the developing nervous system, may damage the brain, and may have a programming or organizing effect on the fetal neuroendocrine system resulting in the permanent disorders mentioned earlier (Mulder et al., 2002, p. 11; see Figure 1).

Clearly stated, the mother's physiological response to anxiety can serve to decrease blood flow to the uterus, leading to growth retardation of the fetus and impaired development of fetal systems (Teixeira et al., 1999).

HPA activation during pregnancy not only affects the uterine environment, but also is associated with obstetric complications. The production of placental CRH has been correlated with the onset of preterm labor, uterine contractility, and preterm delivery, as well as the stress response during pregnancy (Mancuso et al., 2004; Novak-Antolič, 2001). Mancuso and colleagues (2004) focused on the neuroendocrine processes associated with preterm labor and uterine contractility. Specifically, these researchers attempted to assess causality between the release of

CRH, which is produced during states of anxiety, and early delivery. As a part of a larger study, data from 282 pregnant women were examined for CRH levels and prenatal anxiety at three separate time points: 18 to 20 weeks (Time 1), 28 to 30 weeks (Time 2), and 35 to 36 weeks (Time 3). Unlike most studies, these investigators captured an ethnically diverse sample consisting of 43% African Americans, 24% Caucasians, and 32% of Latin descent, thus increasing the generalizability of the results. The authors discovered a correlation between heightened anxiety levels and the timing of uterine contractions. Women with higher levels of prenatal maternal anxiety delivered earlier than those with lower levels of anxiety. CRH appeared to be a partially mediating variable. These findings were robust even after controlling for sociodemographic variables including parity, medical risk, income, and education. Previously stated, CRH production increases significantly within the latter half of the pregnancy (i.e. the end of 2nd trimester and into 3rd trimester). Therefore, maternal stress during this time can adversely impact the preparation for delivery and birth by causing preterm uterine contractions and decreased blood flow to the developing fetus Mulder et al., 2002; Rich-Edwards & Grizzard, 2005; Teixeira et al., 1999).

Prevalence and Incidence of Anxiety

Prevalence

"Psychiatric disorders, particularly mood and anxiety disorders, have the

highest prevalence in women during the childbearing years" (Cott & Wisner, 2003, p. 217). According to the Diagnostic Statistical Manual (4th ed.), text revision (DSM-IV-TR; APA, 2000), most anxiety disorders occur more frequently in women than men, with the exception of Obsessive-Compulsive Disorder, occurring equally in both men and women. The psychological community has increasingly accepted the premise that anxiety disorders are common during the perinatal period (Altshuler, Hendrick & Cohen, 2000; Austin, 2003; Ross & McLean, 2006). Despite this, only a few studies have consistently measured anxiety symptoms across the entire pregnancy (Huizink, Mulder, Robles de Medina, Visser & Buitelaar, 2004; Roesch, Schetter, Woo & Hobel, 2004; Rondó et al., 2003). Reported prevalence rates of anxiety symptoms vary between 25.9 and 52.9%, as measured by the Spielberger State-Trait Anxiety Inventory (STAI; Spielberger, 1983), across all three trimesters of pregnancy (Rondó et al., 2003). These estimates include mild to moderate levels of anxiety symptoms. Another investigation found that only 1% of postpartum women experienced symptoms of anxiety considered to be severe (Britton, 2005).

Prevalence of anxiety symptoms.

The substantially high prevalence of anxiety symptoms during pregnancy suggests that anxiety disorders may be more widespread than previously thought. Defining prevalence rates of anxiety disorders during the perinatal period has

been difficult, even with the increased attention gained by the psychological, medical, and nursing communities (Altshuler et al., 2000). Current research has recorded the incidence of anxiety disorders in this population as 6.6% to 10% (Andersson et al., 2003; Halbreich, 2005); though, even higher reports of anxiety disorders in pregnancy have been published. For example, Adewuya and colleagues (Adewuya, Ola, Aloba, Dada & Fasoto, 2007) indicated that 39% of the pregnant women in a Nigerian sample had an anxiety disorder during their third trimester (n = 172).

Prevalence of specific anxiety disorders.

Rates for specific anxiety disorders have also ranged throughout the perinatal literature. Cohen and colleagues (Cohen, Sichel, Faraone, Robertson, Dimmock & Rosenbaum, 1996) conducted one of the earliest case analyses directed at establishing the prevalence of Panic Disorder during the perinatal period (n = 10). The investigators used a structured clinical interview and discovered that seven out of ten participants continued to meet Diagnostic Statistical Manual (3rd ed.), revised (DSM-III-R; APA, 1987) criteria for Panic Disorder at all assessment visits: 11 weeks, 23 weeks, and 37 weeks and during the postpartum period. This initial study, moreover, illustrated that pregnancy does not immediately equate to an amelioration of panic symptoms due to a women's transition into the pregnancy period. Hence, pregnancy did not appear

to serve a protective function or buffer against such symptoms for these study participants.

According to available reports, the following rates have recently been published for specific anxiety disorders during the perinatal period: Obsessive-Compulsive Disorder, 0.2% to 5.2% (Andersson et al., 2003; Ross & McLean, 2006); Generalized Anxiety Disorder, 0.3% 10.5% (Adewuya et al., 2007; Andersson et al., 2003; Ross & McLean, 2006); Social Phobia, 0.4% to 6.4% (Adewuya et al., 2007; Andersson et al., 2003); Anxiety Disorder Not Otherwise Specified, 4.1 to 4.4% (Andersson et al., 2003; Andersson, Sundström-Poromaa, Wulff, Ástrom & Bixo, 2004a); Panic Disorder, 0.2% to 5.2% (Andersson et al., 2003; Ross & McLean, 2006); and Post-Traumatic Stress Disorder, 0.6% to 6.9% (Andersson et al., 2003; Maggioni, Margola & Filippi, 2006; Ross & McLean, 2006). Kim and colleagues (2006) found anxiety disorders in 10% of their low-income, ethnically diverse sample of expectant mothers (n = 154) in an urban, outpatient antenatal clinic.

In a recent review of the literature, Ross and McLean (2006) examined approximately 31 research studies with the goal of establishing prevalence rates of antenatal anxiety disorders to the exclusion of women who were anxiety symptomatic alone or had subsyndromal anxiety. In addition, articles analyzing the course of anxiety disorders during pregnancy were reviewed (n = 10). Expectedly, anxiety disorders were frequent during the perinatal period.

However, as seen in the aforementioned reviews, the available research contained many inconsistencies in its ability to precisely estimate prevalence rates with the measures employed. Therefore, special attention should be given to how anxiety is operationalized when reviewing the perinatal literature.

Measurement of Anxiety

Screening instruments.

Many psychological screening measures do not account for the physical complaints that occur during pregnancy. For instance, the Beck Anxiety Inventory (BAI; Beck, Brown, Epstein & Steer, 1988), designed for use with woman and men in both clinical and community settings, however, has not been validated for use with pregnant women. Altemus and Brogan (2004) point out that the BAI focuses on the physical correlates of anxiety, such as "difficulty breathing, facial flushing, unsteadiness, light headedness, sweating, and indigestion" (p. 81), leading to a possible overly liberal score of anxiety symptoms on this measure due to the physiological changes during a woman's pregnancy. Therefore, instruments measuring anxiety symptoms should capture more of the cognitive and emotional experiences of anxiety during pregnancy, which serve as more robust indicators of the need for psychological intervention.

The psychological instruments utilized to measure anxiety and that appear most frequently in the perinatal literature include the Spielberger State-Trait

Anxiety Inventory (STAI; Spielberger, 1983), the Primary Care Evaluation of Mental Disorders Patient Health Questionnaire (PRIME-MD, PHQ; Spitzer, Williams, Kroenke, Hornyak & McMurray, 2000; Spitzer et al., 1994), the Crown-Crisp Experiences Inventory (CCEI; Crown & Crisp, 1979), the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983), and the Structured Clinical Inventory for the DSM-IV (SCID; First, Spitzer, Gibbon & Williams, 2002). Other measures that also appear in the literature and will be reviewed include the Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden & Sagovsky, 1987), the Pregnancy Experiences Scale (PES; DiPietro, Ghera, Costigan & Hawkins, 2004), and the Life Events Scale for Obstetric Groups (LESFOG; Barnett, Hanna & Parker, 1983).

The most widely used screening measure for anxiety symptoms in obstetric populations is the Spielberger State-Trait Anxiety Inventory (Austin, Hadzi-Pavlovic, Leader, Saint & Parker, 2005; Breitkopf et al., 2006; DiPietro, Ghera, Costigan & Hawkins, 2004; Spielberger, 1983). This 40-item self-report screening instrument asks patients to rate several statements regarding how they feel currently (S-Anxiety scale) and in general (T-Anxiety scale). These subscales of the STAI will be referred to as the State-Anxiety and Trait-Anxiety scales throughout this review. The STAI focuses on both cognitive and somatic anxiety symptoms and has well-established psychometric properties (Breitkopf et al., 2006; DiPietro et al, 2004). Additionally, the consistent and widespread use

of the STAI in the perinatal research community generates further opportunities for study replication and continued examination of anxiety symptoms in pregnant women.

The Primary Care Evaluation of Mental Disorders Patient Health Questionnaire (PRIME-MD PHQ; Spitzer et al., 2000) has also been used consistently with obstetric patients to assess the existence of mental disorders in this unique population. The original PRIME-MD is comprised of a two-part system, where a patient first completes the first 26-items, and then the clinician evaluates the positive responses. According to the instrument's developers, the clinician-administered scheduled interview averages 8 minutes to complete (Spitzer et al., 1994). The PRIME-MD was developed for use by non-mental healthcare professionals in primary-care settings to identify symptoms associated with diagnoses of Generalized Anxiety Disorder, Panic Disorder, Obsessive-Compulsive Disorder, and Social Phobia. In addition to mood disorders and Bulimia Nervosa, subthreshold diagnoses are also assessed, such as Anxiety Disorder NOS (Spitzer et al., 1994). Unlike its predecessor, the PRIME-MD PHQ is completely self-administered, thereby increasing its clinical utility and efficiency. Notably, it has also been validated for use with an obstetric-gynecological population (Andersson et al., 2003; Andersson et al., 2004a; Kelly, Russo & Katon, 2001). Both measures are often present in the perinatal literature and the diagnostic accuracy of the PRIME-MD PQH has been touted by its

authors (Spitzer et al., 2000), as it is capable of assisting physicians in spotting and therefore treating commonly experienced mental disorders. However, many researchers utilize the PRIME-MD PHQ as a screening tool for psychiatric disorders in the absence of a structured clinical interview (Kelly et al., 2001; Rollman et al., 2005).

Another global screening measure found in the perinatal literature is the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). Seven of the fourteen HADS' items ranked on a four-point Likert scale are used to determine the presence of anxiety symptoms. Unlike the STAI, the HADS does not differentiate between a woman's situational or dispositional anxiety. Furthermore, Jomeen and Martin (2004) contributed evidence for an additional criticism. Their findings suggested the HADS' utility in screening for anxiety symptoms in women early in their pregnancy is significantly limited and may be unsuitable for use with this population.

The Crown-Crisp Experiential Index (CCEI; Crown & Crisp, 1979) is another screening measure that has been employed to evaluate generalized anxiety symptoms in expectant mothers (Glover et al., 2004; Heron et al., 2004). Particularly, the CCEI measures the following constructs: anxiety, phobic anxiety, obsessionality, somatization, depression and hysteria. Scores range from 0 to 16 on each scale assessing the aforementioned dimensions. The CCEI has established concordant validity with the STAI and reported internal consistency of

.80 (Glover et al., 2004).

Because of the high comorbidity of anxiety and depression, some researchers questioned whether the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987) could identify anxiety symptoms during the perinatal period (Austin, 2004). Since the EPDS is frequently used as an antenatal and postpartum depression screen, Brouwers, van Baar and Pop (2001) explored this very issue. These investigators administered the EPDS at 24-weeks gestation and both subscales of the Dutch-language version of the STAI at 32-weeks gestation in a sample of 197 healthy pregnant Dutch women. A principal component analysis identified two subscales – one subscale contained anxiety symptoms, whereas the other contained depressive symptoms. Interestingly, the authors demonstrated limitations of the EPDS as a measure of anxiety:

> Contrary to expectations, the anxiety symptoms subscale did not more highly correlate with other measures of anxiety than the depressive symptoms subscale or the total EPDS. In fact, it was found that using the total EPDS yielded slightly higher correlations than either subscale used separately. (Brouwers et al., 2001, p. 661)

Additional limitations of the EPDS included the subjective and negative wording of several items, possibly obscuring understanding and consequently decreasing its efficacy (Brouwers et al., 2001). For these reasons, the EPDS has some, but limited potential as an anxiety screen when compared to preexisting instruments,

such as the STAI.

Several examiners of antenatal anxiety developed their own screening measures to assess anxiety symptoms uniquely related to the pregnancy experience, which may not be captured by more global measures, such as the STAI, CCEI or PRIME-MD (Brockington et al., 2006; DiPietro et al., 2004; Huizink et al., 2002). Additionally, some researchers have evaluated anxiety symptoms simply by asking only one or a few specific questions tailored to the particular study (Kurki, Hiilesmaa, Raitasalo, Mattila & Ylikorkala, 2000). DiPietro and colleagues (2004) created the Pregnancy Experiences Scale, tapping into the daily hassles, stressors, and uplifting experiences of women who are expecting the birth of a child. The PES contains 50 items rated on a 4-point Likert scale, such as "thinking about the baby's appearance" and "visits to obstetrician/midwife."

The Life Event Scale for Obstetric Groups (LESFOG; Barnett et al., 1983), which is being utilized in the current study, was also created to look at stress distinctly endured by pregravid women. This questionnaire includes both general stressors and those specific to the pregnancy. Only a few investigations have used the LESFOG in its entirety to assess the impact of life event stress on pregnancy. Higher rates on this measure have been correlated with increased distress in some samples of expectant mothers; though, a few studies have adapted items for their own use (Chapman, Hobfoll & Ritter, 1997; Deave, 2005;

Roesch, Schetter, Woo & Hobel, 2004). Additional investigations have employed instruments, such as the Life Experiences Survey (LES; Sarason, Johnson & Siegel, 1978) that exclude pregnancy-related stress from life experiences (Dole et al., 2004).

Diagnostic assessment.

The Structured Clinical Interview for the DSM-IV (SCID; First et al., 2002) is regarded as the "gold standard" of diagnostic instruments used to assess psychiatric disorders and psychological distress. This structured interview, which must be administered by a trained clinician or mental health professional, follows a decision-tree format associated with an interviewee's endorsement or denial of symptoms. Hence, the length of administration time varies significantly; though, times have ranged from one to two hours for a psychiatric patient. First and colleagues (2002) note that SCID administration time with a non-patient varies from thirty minutes to 11.5 hours.

The SCID is often the criterion standard for diagnosing psychiatric disorders, especially when additional screening measures are utilized in a study (Hirshfeld-Becker et al., 2004; Matthey, Barnett, Howie & Kavanagh, 2003). The interview contains separate modules that evaluate symptom presentation in each class of psychiatric disorders found in the DSM-IV. Unfortunately, the SCID has not been frequently used with obstetric groups when compared with anxiety

screening measures. Only one study employed the SCID and anxiety screening measures to assess psychological risk in pregnancy (Field, Hernandez-Reif & Diego, 2006). Glaringly, no prospective investigations currently exist in the literature that employ the SCID as a diagnostic tool with women hospitalized with high-risk pregnancies. Elevated cost and increased time and staff training needed for SCID administration may contribute to its low use (Kashner et al., 2003).

Limitations in anxiety measurement.

Disparities in sample size and the utilization of different diagnostic and screening instruments may contribute to the large discrepancy among studies that attempt to determine prevalence rates of anxiety symptoms. Such differences significantly limit generalizability to diverse obstetric populations. Additionally, most investigations examined anxiety from a cross-sectional perspective, achieving only a glance of the incidence of symptoms during the perinatal period. However, this snapshot approach does not adequately tap into the effects of the physiological and emotional changes occurring across the course of pregnancy. As Rubinchik and colleagues (2005) noted, "It has been difficult to assess the prevalence of panic disorder during pregnancy due to limitations in how research studies have documented it in the literature due to a lack of longitudinal and epidemiologic studies" (p. 101).

Moreover, researchers oftentimes select only one or two screening

measures, most commonly the STAI, to evaluate anxiety symptoms without employing a structured clinical interview for diagnostic purposes (DiPietro et al., 2004; Matthey et al., 2003; Monk et al., 2003). Hence, studies are limited in the assessment of symptom severity and level of functional impairment associated with anxiety. Additionally, Roesch and colleagues (2004) argued that significant methodological weaknesses exist because changes in operational definitions of stress and anxiety often vary depending on the measures that are employed in the study; again, generalizability is compromised.

Some researchers endeavored to address this problem. Roesch and colleagues (2004) incorporated a "latent model of stress" that captures the common variance among the following factors: pregnancy-specific anxiety, state or situational anxiety, perceived stress and medical risk. Regarding the continued inquiry into the effects of stress during pregnancy, they add, "a promising approach involves the use of a multidimensional representation of general stress that incorporates the commonality among indicators of environmental (e.g., life events), perceptual (e.g., perceived stress), and response-based (e.g., anxiety) definitions of stress" (p. 89). Yet, this conceptualization of stress and anxiety is not widely used.

Another unique limitation to the accuracy of estimating prevalence rates of anxiety is the variability in gestational age when pregnant women are surveyed. For example, researchers have evaluated anxiety symptoms in expectant mothers

across the perinatal period (Gurung, Dunkel-Schetter, Collins, Rini & Hobel, 2005; Melender, 2002), as early as the first trimester (Kurki et al., 2000), or as late as the end of the third trimester (Adewuya et al., 2007; Breitkopf et al., 2006; Maggioni et al., 2006; Teixeira et al., 1999). Interestingly, Huizink and colleagues (2004) asserted that anxiety during pregnancy may be its own distinct syndrome, and should have its own set of established criteria.

Caution must be exercised when interpreting reports of the prevalence of anxiety in obstetric groups, as few studies have reached consensus on how common anxiety disorders and even anxiety symptoms are, especially among those women with obstetrically complicated pregnancies.

Comorbidity

Anxiety disorders have often been linked to depressive symptoms and major depression in women (Andersson et al., 2003; Misri et al., 2004). For example, major depression can occur in 10% to 65% of individuals with Panic Disorder (APA, 2000). According to the DSM-IV-TR (APA, 2000), symptoms of anxiety disorders often overlap and co-exist with those criteria used to establish the presence or absence of a mood disorder. "In approximately one-third of individuals with both disorders, the depression precedes the onset of Panic Disorder. In the remaining two-thirds, depression occurs coincident with or following the onset of Panic Disorder" (p. 435). Thus, the established attention

given to examining depression in this particular population may lead to greater understanding and an increase in awareness of the presence of comorbid anxiety.

The comorbidity of anxiety and depression compounds the experience of functional impairment during the perinatal period (Austin, 2004; Field et al., 2006). Further, Breitkopf, Primeau, Levine, Olson, Wu, and Berenson (2006) showed a direct positive correlation among changes in anxiety and depressive symptoms. In their published results of the emotional states of 807 expectant mothers, the authors discovered that "anxiety scores would be predicted to increase by 17.53 units among women reporting severe depressive symptoms relative to minimal symptoms" (p. 160).

Course of Anxiety during Pregnancy

Heron, O'Connor, Evans, Golding and Glover (2004) point out that little is known about the course of anxiety during the perinatal period. Research has found that women who endorsed anxiety symptoms by the 18th week of pregnancy and continued to endorse such symptoms throughout the pregnancy delivered earlier than those who did not experience anxiety (Roesch et al., 2004). Also, anxiety symptoms in early pregnancy have been shown to predict 33% of the variance in continued anxiety symptoms during the third trimester (Gurung et al., 2005).

Other investigators revealed that anxiety symptoms occurring during the

pregnancy might persist into the postpartum period. In the first study examining prevalence of anxiety symptoms preceding hospital discharge in postpartum women, Britton (2005) employed the STAI (State-Anxiety) to evaluate situational anxiety in a study of 422 healthy mother-infant pairs in Utah. Women delivering their first child and those women who required longer hospital stays endorsed more anxiety symptoms. Furthermore, women with unplanned pregnancies, lower marital satisfaction, and stress were also anxiety symptomatic. Specifically, pregnancy-related stress contributed the most variance (7.3%) to elevated anxiety scores on the STAI (State-Anxiety). Factors that appeared to minimize anxiety were a sense of mastery, higher marital satisfaction and selecting an infant healthcare provider prior to delivery. Two demographic factors were significant, but weakly correlated with endorsed anxiety symptoms: being unmarried and a positive history of depression for more than two weeks.

Britton's study (2005) consisted of healthy mothers. Having a sense of mastery appeared to buffer some women from developing anxiety symptoms. However, antenatal women with obstetrically complicated pregnancies would most likely have a lessened sense of mastery and a heightened uncertainty about pregnancy outcomes (Leichtentritt, Blumenthal, Elyassi & Rotmensch, 2005). The interaction of these factors appears to have a significant impact on a woman's experience of her own pregnancy.

Impact of Anxiety on the Pregnancy Experience

Pregnancy often can be accompanied by positive thoughts associated with the discovery of an impending birth and optimism regarding a woman's new role as a mother (Trad, 1990). For some women, however, this transition results in uncertainty and fear. Pregnant women experience additional concerns about their own health, the health of the unborn child, physical change to their bodies, and thoughts relating to delivery (Halbreich, 2005; Maloni et al., 1993; Mulder et al., 2002). Fisher (2006) adds, "The birth of a baby demands dramatic and personally costly adaptations of women, including the relinquishing of autonomy, personal liberty, occupational identity, capacity to generate income and social and leisure activities in service of infant care" (p. S34).

Women who were anxiety symptomatic endorsed uncertainties including fear of inadequacy as a mother, fear of childbirth, fear of fetal abnormality, and fear of fetal death (Brockington et al., 2006). Other studies have found similar fears experienced by pregnant women during this time (Melender, 2002). In addition, anxiety symptoms often can be masked by somatic complaints that occur naturally in pregnancy, such as feelings of physical tension and discomfort, shortness of breath, nausea, stomach pain, heart pounding (Kelly, Russo & Katon, 2001; Weisberg & Paquette, 2002). In an Australian sample of primiparous women ($N = 53$), Hart and McMahon (2006) showed that trait anxiety, independent of depression, was significantly related to less adaptive thoughts

about motherhood and the pregnancy, negative self-perceptions as a mother, poorer quality of maternal-fetal attachment, and increased maternal worries. Whereas many studies have established the existence of this relationship during the postpartum period, the present study sheds light on the existence of negative psychological sequelae during the pregnancy due to the presence of anxiety symptoms.

Antenatal Anxiety and Fetal Development

The correlation between maternal anxiety and adverse developmental outcomes for the fetus and following delivery has been broadly researched. For example, Van den Bergh and colleagues (2005) reviewed studies spanning the last 20 years, noting that the most replicated findings in antenatal anxiety research focused on the relationship among antenatal distress and anxiety, preterm delivery, and low weight-for-gestational-age. Yet, these studies were methodologically limited in their ability to identify correlations between maternal anxiety and outcomes after birth (Van den Bergh et al., 2005).

Timing of antenatal anxiety.

In 2003, Austin's review of available literature posited that the small, but growing body of investigations has focused specifically on the effects of antenatal distress, including both anxiety symptoms and depression on postnatal outcomes.

Several of these studies highlighted the impact of anxiety and depressive symptoms on the developing child while in the womb. Uncertainty, however, persists regarding when anxiety symptoms are most detrimental to the expectant mother and her fetus. Some researchers have suggested that the greatest risk of negative outcomes associated with antenatal anxiety exposure occurs up to 28 weeks of gestation (Van den Bergh et al., 2005), though this assertion has been debated (Roesch et al., 2004). In a later review of the literature, Van den Bergh and colleagues (2006) emphasized the gains made by conducting correlative research; though, they also highlighted the ongoing limitations, such as the lack of finding a causal link that exists in determining the stage of fetal development most vulnerable to the mother's negative affective experiences.

Antenatal anxiety and fetal heart rate.

Elevated maternal antenatal anxiety has been positive correlated with unstable heart rate (HR) variability in fetuses and the presence of congenital abnormalities (Sjöström, Valentin, Thelin & Marsal, 2002). Conversely, no relationships have been discovered among anxiety, fetal movements, and the percentage of time spent in fetal movement (Monk et al., 2000; Sjöström et al., 2002). Later, Monk and colleagues (2003) discovered an interesting interaction between anxiety and fetal HR: "the more anxious the woman, the greater the likelihood that the fetal HR decreases after the termination of the stressor period"

(p. 36). The authors posited that both the expectant mother's cardiovascular reactivity, as well as trait anxiety, contributed a significant amount of the variance in fetal heart rate response during the recovery period after completion of the task, $r^2 = .69$, $p < .001$.

Antenatal anxiety and congenital abnormalities.

Ács, Bánhidy, Horvath-Puhó and Czeizel (2006) examined the prevalence of anxiety disorders using matched-controls in expectant Hungarian mothers who had children with congenital abnormalities ($N = 22,843$). The authors determined the presence of an anxiety disorder diagnosis by review of medical records, prenatal logbooks, and self-report measures. After controlling for multiple demographic variables, the researchers found a teratogenic effect of anxiety in this population. Particularly, an increased rate of Panic Disorder was associated with higher prevalence of cleft lip with or without cleft palate (CL/P), in addition to the presence of multiple congenital abnormalities. Additionally, pregnant women with anxiety disorders had a higher percentage of smoking than those with no diagnosis. Furthermore, the use of some medication to treat Panic Disorder, including fetal exposure to benzodiazepines, was correlated with a significant decline in the risk for CL/P.

Antenatal Anxiety and Developmental Outcomes

A significant body of literature has centered on examining the effects of anxiety on the mother-child interaction and maternal perceptions of infant temperament (Davis et al., 2004; Huizink et al., 2002; Pesonen, Raikkonen, Strandberg & Jarvenpaa, 2005); infantile colic (Canivet, Östergren, Rosén, Jakobsson & Hagander, 2005); behavioral difficulties such as impulsivity and attention-deficit/hyperactivity disorder (Van den Bergh et al., 2005; Van den Bergh et al., 2006); and atypical handedness in the child (Glover et al., 2004).

Antenatal anxiety and mother-child interaction.

In an early study of mother-child relationships, Adler and colleagues (1991) did not detect a relationship among anxiety (both situational and dispositional) and mother-child attachment post-delivery, mother's own maternal attachment, perceived social support, and lower socioeconomic standing. These researchers followed all participants ($N = 134$) from the second trimester into the postpartum period. Notably, some of Adler and co-authors' (1991) findings were inconsistent with more recent research (Austin, Hadzi-Pavlovic, Leader, Saint & Parker, 2005). Trait anxiety during the third trimester has been linked to difficult infant temperament post-pregnancy, even after controlling for sociodemographic variables (e.g., infant gender, age, education, income, marital status, obstetric complications, infant gender and prematurity) (Austin et al., 2005). Specifically,

an Odds Ratio of 2.56 associated with the STAI, equated to higher rates of maternal report of difficult infant temperament at 4 to 6 months postpartum. "Antenatal trait anxiety appears to represent independent risk factors for difficult infant temperament" (Austin et al., 2005, p. 189). All of these investigations examining developmental outcomes, except for one, excluded expectant women with high-risk pregnancies.

Physiological sequelae of antenatal anxiety in offspring.

The long-term biological changes in children exposed to maternal antenatal anxiety have begun to be explored. Among participants enrolled in a European community-based study, the Avon Longitudinal Study of Parents and Children (ALSPAC), children of mothers who were anxiety symptomatic during their pregnancy displayed elevated cortisol production (O'Connor et al., 2005). Similar results previously had been demonstrated in other ALSPAC-based studies (O'Connor, Heron, Golding, Beveridge & Glover, 2002; O'Connor, Heron, Golding, Glover & Team, 2003). The effect of maternal antenatal anxiety in the latter part of gestation was demonstrated through earlier studies assessing 4- and 7-year-olds (O'Connor et al., 2002). The offspring of anxious mothers demonstrated significant behavioral and/or emotional problems, after a multitude of sociodemographic variables were statistically controlled for in the analyses. Deficits appeared to be extensive and long-lasting; though, caution should be

taken when implying causal relationships among maternal anxiety and developmental outcomes based on available data (Oates, 2002).

Even though several investigations have published results that suggest antenatal anxiety affects the development of the offspring, Andersson and colleagues (2004b) contradict this finding. These authors posit that the significant effects found in previous studies occurred in much smaller sample sizes. In order to test this assertion, the same investigators conducted a population-based study assessing the psychological state of 1465 women during their second trimester. Analyses revealed no divergence among healthy moms and those diagnosed with an anxiety or depressive disorder on preterm births (Andersson et al., 2004b).

Debate concerning the impact of antenatal anxiety on child development persists, highlighting the need for additional research. Given the prevalence and serious implications of anxiety on expectant mothers and their children, assessment of variables that contribute to the development of anxiety is crucial.

High-Risk Pregnancy

Detrimental pregnancy complications pose a significant public health risk due to potential long-term health consequences and increases in patient healthcare costs (Williams et al., 2006). According to the National Vitals Survey (Martin et al., 2006), approximately 4.1 million births were recorded in the United States in 2004. As previously stated, obstetric complications, in addition to anxiety

symptoms and anxiety disorders, have contributed to adverse outcomes such as low birth-weight and premature delivery. Preterm births comprised 12.4% of all births recorded in 2004. Bacak, Callaghan, Dietz and Crouse (2005) estimated the occurrence of 12.8 pregnancy-related hospitalizations for every 100 births from 1999 to 2000. As per these authors, several demographic variables were correlated with antenatal hospitalizations: 24 years-of-age or younger, being African American, and lack of private insurance (Bacak et al., 2005). Plausibly, the interaction of demographic and environmental factors may influence the need for hospitalization during the antenatal period, especially in circumstances of a high-risk pregnancy. As a result, further understanding and exploration of the interrelated patterns and factors associated with obstetric risk is warranted (Halbreich, 2005).

Definition of High-Risk Pregnancy

Schroeder (1996) defined high-risk as obstetric complications occurring between the second and third trimesters. Hobel, Hyvarinen, Okada, and Oh (1973) operationalized high-risk pregnancy more generally, as those obstetric factors "that could adversely influence the outcome of the infant during postnatal life" (p. 2). In these authors' seminal work, Hobel and colleagues (1973) developed a screening assessment to capture the number of risks that could adversely affect the birth of the child. The definition of high-risk is not limited to

adverse events that only affect the fetus. For example, the conceptualization of high-risk has expanded to encompass those harmful events that compromise the health of the mother, fetus, or both and also affect the outcome of pregnancy (Gray, 2006; Leichtentritt, Blumenthal, Elyassi & Rotmensch, 2005). The U.S. Department of Health and Human Services ascertained population statistics on the experience of pregnancy in the United States. The Pregnancy Risk Assessment Monitoring System (PRAMS), which is administered by the Center for Disease Control's National Center for Chronic Disease Prevention and Health Promotion, Division of Reproductive Health, provides one method for obtaining such data (Williams et al., 2006). In 2002, the PRAMS survey collected a variety of pregnancy experiences in 31 states and New York City, regardless of the locale of antenatal care. Obstetric complications documented through the survey included "preterm or early labor; high blood pressure; vaginal bleeding; problems with the placenta; severe nausea, vomiting, or dehydration; diabetes; kidney or bladder infection; premature rupture of the membranes; incompetent cervix or cerclage; and injuries from car accidents" (Williams et al., 2006, p.124). Additional common diagnoses associated with high-risk pregnancy are fetal anomaly, placenta previa, multiple gestation, and oligohydramnios (Giurgescu, Penckofer, Maurer & Bryant, 2006; Gray, 2006; Gupton, Heaman & Cheung, 2001; Maloni, Cohen & Kane, 1998; Martin et al., 2006; Williams et al., 2006). The National Vitals Survey (Martin et al., 2006) identified pregnancy-induced hypertension and

diabetes as the two most prevalent risk factors since data became available.

The nursing community has been at the forefront of conducting research recognizing the impact of high-risk pregnancy on the expectant mother's emotional well-being (Heaman, 1992; Heaman & Gupton, 1998; Maloni et al., 1993; Maloni, Kane, Suen & Wang, 2002; Martin-Arafeh, Watson & Baird, 1999; Schroeder, 1996). Though interest in the specific psychological and physical experiences of expectant mothers has recently increased in other fields of study, pregnant women with obstetric complications is one population that has scarcely been empirically examined.

An increase in stress and anxiety may increase when a pregravid woman is labeled as high-risk by a healthcare professional because of the presence of obstetric complications (Gupton et al., 2001; Maloni, Brezinski-Tomasi & Johnson, 2001). Many of those classified as having high-risk pregnancies experience a moderate level of distress, especially among younger and less-educated expectant mothers. Giurgescu and colleagues (2006) researched the influence of distress in a high-risk pregnancy sample presenting at an antenatal clinic ($N = 105$) located in the Midwestern United States. The average gestational age of participants was 32 weeks (Range: 24 to 36 weeks). Preeclampsia (or pregnancy-induced hypertension), gestational diabetes, and abnormality of tests for fetal well-being were the most common obstetric complications recorded among participants. These authors found that "although the level of uncertainty

for this sample was low, participants who reported high levels of uncertainty used avoidance to cope with their situation, and this coping strategy was related to higher levels of distress" (p. 363). Women in this study were not hospitalized because of their high-risk status.

Expectant mothers with obstetric complications also experience feelings of grief associated with the loss of a healthy, uncomplicated pregnancy and delivery (Curry, 1987; Heaman, Beaton, Gupton & Sloan, 1992). Heaman and colleagues (1992) published early support for such findings. In their study, nulliparas with high obstetric risk (n = 75) had less positive expectations about their pregnancy, lower childbirth preparation, and significantly higher levels of state anxiety (M = 38.8 vs. M = 34.3), as measured by the STAI, when compared to those women with low risk pregnancies (n = 77). Additionally, anxiety symptoms were negatively correlated with positive childbirth expectations in both the high-risk (r = -.24, $p < .01$) and low-risk groups (r = -.36, $p < .01$). The authors added that anxiety was the only significant predictor among low-risk nulliparas, and accounted for 23% of the variance of childbirth expectations.

Brisch and colleagues (2002) compared low- and high-risk pregnant women. High-risk pregravid women (n = 497) were categorized into 5 subgroups based on their obstetric condition: 1) suspected fetal abnormality; 2) complications with previous pregnancies; 3) maternal disease/medication; 4) advanced maternal age; and 5) endocrine testing. Expectant mothers with

multiple risk factors from the previous groups comprised the sixth group. Scores on the German-language version of the STAI determined participants' levels of anxiety at three consecutive time points: Time (T) 0 – immediately before ultrasound screening, T1 – 4-5 weeks after T0, and T2 – 8-10 weeks after T0. Those in the high-risk group had higher anxiety scores prior to their first ultrasound screening than low-risk expectant mothers. Virtually no demographic differences emerged between the high-risk group and low-risk group. Advanced maternal age, however, was positively associated with high-risk status. Greater parity was also related to high-risk pregnancy in this sample. Nonetheless, anxiety levels in this group dissipated with each additional screening. By the tenth week screening, there were no statistical difference between healthy controls and high-risk participants.

The investigators found specific group differences among the high-risk pregnant women. Pregravid women with endocrine screening (Group 5) displayed the highest anxiety levels among the high-risk subgroups. The researchers state, "the pathological levels of special endocrine hormones (e.g., alpha-fetoprotein) indicated a statistically higher risk of fetal malformation, because these pathological levels of endocrine hormones are statistically more often associated with fetal abnormalities" (p. 232). In consequence, the mother's awareness of potentially considerable negative outcomes, including the risk to her fetus may have increase maternal antenatal anxiety. As with the rest of the

groups, the anxiety levels in this group also decreased after subsequent ultrasounds. Hirshfeld-Becker and colleagues (2004) extends this line of perinatal research by publishing their results of a possible link between obstetric complications and the development of anxiety disorders in children.

Bed Rest and Hospitalization in High-Risk Pregnancy

Effect on psychological functioning.

The PRAMS survey, as previously discussed, also captures information on the hospitalization of expectant mothers with obstetric complications, including length of stay, and length of time at home or on bed rest (Williams et al., 2006). Expectant mothers diagnosed with placenta previa and pregnancy-induced hypertension were most often prescribed hospitalized bed rest (Maloni et al., 1998; Schroeder, 1996). According to the PRAMS report, the length of stay in a hospital significantly varies by participating states. Prevalence rates of those pregravid women requiring at least one day of hospitalization ranged from 8.0% in Washington to 17.7% in West Virginia. Prescribed bed rest often accompanies a "high-risk" label for the expectant mother. Therefore, dysphoria associated with a loss of independence accompanies pre-existing health-related concerns (Heaman & Gupton, 1998; Leichtentritt et al., 2005; Maloni et al., 2001; Martin-Arafeh et al., 1999).

Most obstetricians recommend bed rest as a method of reducing additional

obstetric risk in women with diagnosed pregnancy complications (Goeldenberg et al., 1994; Maloni et al., 1993). Though controversy exists regarding its efficacy and practicality, bed rest is still a commonly prescribed intervention (Maloni et al., 1998). Thus, another component of a woman's complicated pregnancy is a significant decrease in her mobility and the possible separation from loved ones if hospitalized (Martin-Arafeh et al., 1999). The addition of these stressors to those related to her medical condition, or that of the fetus, can serve to significantly increase anxiety in the expectant mother (Perkin, 1999).

Maloni, Chance, Zhang, Cohen, Betts and Gange (1993) conducted one of the early studies documenting the psychological and physical sequelae of bed rest during pregnancy ($N = 35$). Participants were hospitalized for monitoring of various obstetric complications that include preterm labor (47% of the sample), preterm rupture of membranes or incompetent cervix (12%), placenta previa (12%), or preterm labor in addition to another complication (29%). The participants fell into one of three categories of bed rest: complete bed rest ($n = 10$) for 10 or more days; partial bed rest ($n = 7$), "defined as confinement to bed for part of the day and never on complete bed rest for 2 or more days"; and "not on bed rest (normal)" ($n = 18$). Expectant mothers' affective responses to bed rest were acquired through the Multiple Affect Adjective Checklist-R (MAACL-R). According to the authors, symptoms of dysphoria were operationalized as scores on three of the five MAACL-R scales that tap into anxiety, depression, and

hostility. Analyses revealed that women on complete bed rest endorsed more dysphoric symptoms (M = 9.66, SD = 6.06) than partial bed rest patients (M = 4.71, 5 = 5.37) and those expectant mothers not on bed rest (M = 2.35, SD = 3.55) at the beginning of hospitalization. This trend continued over the course of participants' pregnancies, though dysphoria decreased as length of hospitalization increased. The authors account for the improvement in mood, noting that reassurance and safety may be gained with the close monitoring of pregnancy within the confines of the hospital. Similar results were discovered 9 years later (Maloni et al., 2002). Means reported in the follow-up examination were almost identical to their previous results. Again, the authors (Maloni et al., 2002) relayed that decreased dysphoria across hospitalization may signal the progression of the pregnancy, equating to increased health and continual development of the fetus. They add:

> The decrease in antenatal dysphoria is supported by the parallel increase in positive affect, thus the decrease is not surprising. Women on bed rest rapidly learn that each day the pregnancy is prolonged provides increased fetal development and decreased likelihood of fetal morbidity and mortality. (p. 98)

Leichtentritt and colleagues (2005) qualitatively observed the emotional experiences of women hospitalized with high-risk pregnancy. Through focus groups, they identified several key themes that surfaced during the open dialogue

among hospitalized pregnant women and their healthcare professionals, including fear and anxiety, ambivalence toward the pregnancy and outcome, anger, frustration, and loneliness. Ambivalence was primary and developed from the coexistence of conflicting emotions, such as dread associated with risk to the health of the patient and fetus, as well as hope for a successful completion of pregnancy (Leichtentritt et al., 2005).

Effect on the family system.

Women and their families face a magnitude of stress when coping with complicated pregnancy (Martin-Arafeh et al., 1999). Utilizing a family-centered approach to providing healthcare, such as promoting the use of structured family assessments and developing appropriate family-based interventions has been effective in decreasing family and patient strain (Martin-Arafeh et al., 1999).

Maloni, Brezinski-Tomasi, and Johnson (2001) retrospectively examined the effects of bed rest on the family unit, by gathering information from 89 women who were on bed rest (either at home or hospitalized). High-risk pregnant mothers expressed concern about their shifting roles as primary caretakers to that of observers, financial hardships, and stress relating to maternal/fetal health. Obtaining emotional support was vital during pregnancy, as they perceived this form of support to be the most helpful. Instrumental support, such as assisting with household and family responsibilities, was also beneficial to patients.

Expectant mothers indicated through self-report that healthcare professionals provided minimal support (6.1%; Maloni et al., 2001). Therefore, a substantial issue is raised regarding the ability of healthcare practitioners to identify the needs of high-risk hospitalized pregnant women. Such needs extend beyond physical concerns, such as obstetric risk, but also include the psychological well-being of the mother and her family.

Maternal and Fetal Obstetric Risk Factors

The most common pregnancy-related complications often resulting in hospitalization are preterm labor, gestational hypertension or preeclampsia, premature rupture of membranes, and gestational diabetes. The prevalence of these risk factors often varies by age (Martin et al., 2006; Williams et al., 2006). Additional obstetric complications that pose health risks are uterine rupture, previous caesarean surgery, and multiple gestation (Fisher, 2006; Geller et al., 2004; Hobel et al., 1973; Kwee, Bots, Visser & Bruinse, 2005).

Kurki and colleagues (2000) conducted a prospective population study in Helsinki, examining both anxiety and depressive symptoms and the risk for preeclampsia among healthy, Caucasian, nulliparous pregnant women ($N = 623$) from 8 to 17 weeks' gestation. At study enrollment, none of the participants had a high risk of preeclampsia; expectant mothers with essential hypertension were excluded from the study. Anxiety symptoms were ascertained by summing

participants' rated responses on a 4-point Likert scale to the following question: "Are you tense or distressed?" Higher scores were conceptualized as an increased risk of anxiety. Depressive symptoms were obtained using a modified version of the Beck Depression Inventory (BDI). Twelve percent of the study population endorsed anxiety symptoms; furthermore, a more than 3-fold association between elevated anxiety in early pregnancy and risk for preeclampsia was discovered (OR 3.2, 95% CI: 1.4 - 7.1). Despite the limitation of only one assessment of antenatal mood and anxiety during pregnancy, Kurki and colleagues' (2000) study establishes a relationship between anxiety and obstetric risk that could result in a compromised pregnancy.

A diagnosis of multiple gestation is another obstetric complication commonly associated with hospitalization during pregnancy. The added physical and psychological strain of being pregnant with more than one fetus can create greater anxiety in an expectant mother and her support system. For example, Fisher (2006) stated:

> These adaptations including for some, harm to bodily integrity through unexpected adverse reproductive events place great demands on individual psychological resources and existing relationships and are greater in women who conceive and give birth to multiple infants. (p. S34)

Anxiety symptoms may emerge when a mother worries about her own health, the health of both fetuses, and the increased risk of fetal demise due to multiple

gestation. Additionally, premature births and probable cesarean surgery are often common in multiple gestational pregnancies, thereby creating additional stressors such as separation of the infant(s) from the mother and subsequent transfer to neonatal intensive care unit (Fisher, 2006). The expectant mother must also face the challenge of caring for not only one, but two neonates resulting from multiple gestation.

As aforementioned, other complications connected to high-risk pregnancy are premature rupture of membranes (PROM), preterm labor (PTL), and bleeding in late gestation, (which also encompasses placenta previa and abruption placenta). Treatment for such obstetric risks ranges from least restrictive weekly monitoring to immediate hospitalization, as risk severity changes (Andersson et al., 2004a). More specifically, PROM is a potentially life-threatening condition that is experienced by approximately 3 - 10% of women diagnosed with a high-risk pregnancy (Medina & Hill, 2006; Mu, 2004). Mu (2004) interviewed thirteen Taiwanese married couples coping with hospitalization due to a diagnosis of PROM and discovered the presence of psychological distress. Four themes associated with the family's health-to-illness transition were derived from the hour-long interviews as expectant mothers were hospitalized: pending loss linked to potential fetal demise and long-term health issues; security of the fetus associated with this imperceptible threat (PROM); changes in and doubts about efficacy of maternal role; and feelings of loss of control. Uterine rupture is

another obstetric complication that poses similar and significant health risks to both the mother and fetus including perinatal death and hysterectomy, and is commonly associated with previous caesarean surgery (Kwee et al., 2005).

Anxiety has been shown to be pervasive in expectant mothers diagnosed with fetal risk. Aite and colleagues (2002) discovered heightened maternal anxiety, as measured by the Italian-language version of the STAI (State-Anxiety), through case-control study analyses among expectant couples diagnosed with fetal gastrointestinal anomaly. Women who received a multidisciplinary intervention comprised of discussions with the obstetrician, pediatric surgeon, and a psychologist had much lower state anxiety scores ($M = 39.87$, $SD = 6.46$, $p < .01$) than those who received treatment-as-usual ($M = 70.62$, $SD = 4.12$, $p < .01$).

These investigations, along with the examination conducted by Brisch and colleagues (2002), empirically support the notion that expectant mothers are psychologically vulnerable to the multitude of obstetric risks that they and their developing fetuses may experience during the pregnancy. Clearly, interventions targeting anxiety are needed to decrease this vulnerability and promote psychological health. Moreover, awareness of the impact of obstetric risk on psychological functioning during pregnancy is essential. Other variables, however, also contribute to the expectant mother's ability to cope during such stressful circumstances. Specifically, psychosocial variables, such as adjustment

in one's romantic relationship and whether the pregnancy was intended, may play a role in the development of anxiety during pregnancy.

Impact of Psychosocial Variables on Antenatal Anxiety

Dyadic Adjustment

A woman experiences both intrapersonal and interpersonal changes with a new pregnancy (Dulude, Belanger, Wright & Sabourin, 2002; Trad, 1990). Family members often have to traverse many changes when the prospect of a new child is introduced to the family. Such family alterations include modifying the roles and responsibilities of becoming parents for the first time or again, or aiding in the adjustment of other children as they await the arrival of the baby (Glazier et al., 2004; Martin-Arafeh et al., 1999). The expectant mother's quality of and adjustment in the marital relationship, or the relationship with a significant other, is likely to play a role in maternal adjustment during pregnancy.

Spanier (1976) conceptualized relationship or dyadic adjustment as "…a process, the outcome of which is determined by the degree of: (1) troublesome dyadic differences; (2) interpersonal tensions and personal anxiety; (3) dyadic satisfaction; (4) dyadic cohesion; and (5) consensus on matters of importance of dyadic functioning" (p. 17). The level of adjustment in the romantic relationship in which the expectant mother may be involved, and subsequent support she receives, becomes crucial when facing the extensive physical and psychological

demands of pregnancy, including the need for both instrumental and emotional support (Maloni et al., 2001). Additionally, the expectant mother's role in the family transitions as her ability to function in the household changes. Fathers, if present, may be required to take on additional responsibilities that were once performed by the now-expectant mother, thus affecting the relationship (Leichtentritt et al., 2005; Maloni et al., 1993; Mercer, Ferketich & DeJoseph, 1993; Mu, 2004; White & Ritchie, 1984).

Regarding the mother's possible focus on her health and that of the fetus, Dulude and colleagues (2002) state, "therefore, they [high-risk pregravidas] may spend less energy on monitoring and maintaining the quality of interpersonal interactions with their spouse or with the rest of their family" (p. 104). These researchers examined the impact of high-risk pregnancies on psychological well-being and relationship adjustment during the transition from pregnancy to parenthood. They compared the scores of 22 couples with obstetric complications and 23 low-risk couples on the Dyadic Adjustment Scale (DAS; Spanier, 1976), and on a measure of psychological distress containing subscales of anxiety, depression, cognitive disturbance, and hostility. Each couple provided self-reports at three time points: during the last trimester of pregnancy, between third and ninth postpartum month, and lastly, between the ninth and twelfth postpartum month. Multivariate analyses of variance revealed that expectant mothers experienced clinically significant, but mild distress during pregnancy.

Psychological stress dissipated for most parents after the birth of a healthy infant. Contrary to the authors' predictions, the experience of high-risk pregnancy was not shown to negatively affect marital adjustment, $F(1,41) = 0.38$, $p > .05$. Interestingly, high-risk parents reported lower levels of anxiety than low-risk parents during the transition into parenthood. The authors reason that couples experiencing high-risk pregnancy are often required to make significant adaptations to their lifestyles and expectations during the pregnancy in order to cope; moreover, these early adjustments lead to a decrease in subsequent anxiety in the postpartum period (Dulude et al., 2002).

Da Costa, Larouche, Drista and Brender (1999) examined marital adjustment, as one of the possible contributing factors to anxiety across the course of a woman's pregnancy in a low-risk sample ($N = 161$). Inclusion criteria maintained that women must be either married or in a stable relationship at the time of recruitment. State anxiety, pregnancy-related stress, and perception of daily stressors were also analyzed. Data collection consisted of structured interviews conducted once during each trimester, while self-report measures were obtained monthly. Approximately 17% of the sample experienced one obstetric complication during the study period. These authors found that state anxiety was highest during the third trimester. Marital adjustment accounted for 7% of the variance in state anxiety during the third trimester, while the occurrence of an obstetric complication contributed to 3% of variance in third-trimester state

anxiety. Marital discord was also positively correlated with pregnancy-specific stress. It can be extrapolated that women with greater marital adjustment and satisfaction with the relationship may receive more social support from their partner. Expectant mothers who do not have such support, and further, are involved in a discordant relationship, may be at greater risk for experiencing symptoms of anxiety (Glazier et al., 2004).

Marital or relationship discord is one of many stressful life events that can occur during a woman's pregnancy. Chapman, Hobfoll, and Ritter (1997) investigated the effects of partner support in low-risk expecting dyads once during the second trimester and again during the third trimester. Within this lower socioeconomic sample ($N = 86$), these authors assessed pregnant women's perceptions of stressful life events utilizing the Life Events Scale for Obstetric Groups (LESFOG; Barnett et al., 1983), their sense of social support, and associated mood as measured by responses on the BDI. Consistent with more recent research (Gurung et al., 2005), women with higher ratings of stressful life events had lower mood. Moreover, expectant mothers' ratings of stressful life events were negatively correlated with partner support. The risk of low mood increased significantly among expectant mothers whose partners underestimated their level of stress as compared to those mothers whose partners were attentive to their stress. The authors also assessed the expectant mother's perception of the support they received from their partners and discovered a negative correlation

between number of conflict-related events in the relationship and perception of intimate support from her partner over time. No demographic variables were significantly correlated to the effects of stressful life events and partner support.

Relationship adjustment among women with high-risk pregnancies is severely understudied. As discussed above, a relative few investigations have qualitatively accounted for relationship distress. However, none have empirically explored the relationship between marital adjustment and anxiety in a high-risk hospitalized population.

Stressful Life Events

Chronic stress is commonly examined and related to negative perinatal outcomes, such as preterm labor (Dominguez, Schetter, Mancuso, Rini & Hobel, 2005; Rich-Edwards & Grizzard, 2005). Dominguez and colleagues (2005) examined stress and its influence on perinatal outcomes in an African-American population ($N = 178$), since African-American women have been shown to have greater risk and higher morbidity and mortality rates during pregnancy (Geller et al., 2006; Williams et al., 2006). Across this 3-year prospective study, the following psychosocial stressors at three time points during pregnancy and immediately postpartum were examined: stressful life events, state anxiety, life events distress, pregnancy-specific anxiety, intrusive thoughts, pregnancy-specific stress, perceived stress, and pregnancy undesirability. On average, participants

experienced approximately 6.7 stressful life events (*SD* = 2.89; Range: 1 to 16). All participants reported experiencing at least one SLE. Almost 70% reported no intention of getting pregnant; while, only a small percentage (7%) had ever considered termination or adoption. Interestingly, most participants denied experiencing distress or anxiety, though they endorsed experiencing multiple adverse life events. The authors note that possible underreporting of distress could be explained by the cultural norms of African-American women shouldering burdens without complaint; however, the authors found significant positive relationships among the number of SLE, shorter length of pregnancy, and smaller size of the neonate. This relationship was independent of medical risk (Dominguez et al., 2005).

In 2004, Dole and colleagues observed mixed results in their data from the Pregnancy, Infection, and Nutrition Study. They found no relationship between higher perceived distress from adverse life events and preterm birth among African-American women. Yet, a relationship among these factors and preterm birth did exist for Caucasian women in the sample (RR = 2.2, 95% CI: 1.3 - 3.5). These researchers (Dole et al., 2004) also found evidence that pregnancy-related anxiety contributed to an increased risk of preterm birth for both African-American (RR = 2.0, 95% CI: 1.3 - 2.2) and Caucasian women (RR = 1.6, 95% CI: 1.1 - 2.3). Research also considered whether the timing of stressful life events during pregnancy influence a woman's appraisal of that event (Glynn, Schetter,

Wadhwa & Sandman, 2004). However, this area has not been fully explored.

The treatment recommendation of hospitalization for close monitoring of an expectant mother can be considered a stressful life event (Rostad & Schei, 1998; Yali & Lobel, 1999). Additionally, the actual hospitalization, which encompasses distancing from one's family and decreased activity, can compound the experience of anxiety (Heaman & Gupton, 1998; Maloni et al., 1998). Rostad and Schei's (1998) examination compared women with high-risk pregnancies who were hospitalized at some point during their pregnancy (study group; $n = 88$) with non-hospitalized women, though they still had obstetrically-complicated pregnancies (control group; $n = 363$). The authors learned that women who rated themselves as having poor health, had experienced previous perinatal death, had threatened preterm birth, and had exposure to severe life events were more likely to be hospitalized than those in the control group.

Another life event stress that has been correlated with poor pregnancy outcomes is previous loss of a child or miscarriage. Experiencing a perinatal loss is both very traumatic and not uncommon (Geller et al., 2004). Lay thought regarding the joys of pregnancy has contributed to the notion that having another pregnancy after perinatal loss would decrease the grief and the number of concerns once held, now that a woman is once again pregnant. However, several researchers believe these assumptions to be both troubling and inaccurate (Armstrong, 2004; Fisher, 2006). Perinatal loss appears to be directly related to

pregnancy as a continuous life experience. Therefore, the loss would significantly impact the expectant mother's current pregnancy. Armstrong states, "…1 in 4 childbearing couples will experience some type of pregnancy loss" (p. 769).

Armstrong (2004) examined the effect of previous perinatal loss and anxiety in subsequent pregnancies. Through single phone interviews of pregnant women and their significant partners ($N = 80$), This author demonstrated that, contradictory to somewhat commonly viewed ideas about pregnancy, anxiety levels actually increased with the current pregnancy when a perinatal loss had previously occurred. Expectant mothers reported higher anxiety than their male partners and decreased attachment to the fetus as their pregnancy-specific anxiety increased. This author suggested that distancing oneself from the fetus may be a self-protective function against the risk of future loss. Geller, Kerns, and Klier (2004) echo these findings in the first review centered on miscarriages and subsequent pregnancy experiences. They raise the issue that many women who have miscarried may have anxiety disorders that often go undetected.

Pregnancy Intendedness

Another facet connected to antenatal anxiety is the expectant mother's perception about her pregnancy and whether the pregnancy is desired or intended. Pregnancy intendedness has been conceptualized as woman's perception about the timing of her pregnancy and if the pregnancy is wanted or not (Williams et al.,

2006). Finer and Henshaw (2006) stated that unintended pregnancies "include both those that were mistimed (i.e., the woman wanted to become pregnant at some point in the future, but not yet) and those that were unwanted (the woman did not want to become pregnant now or in the future" (p. 91). According to the National Survey of Family Growth and additional analyses of pregnancy statistics from 1994 to 2001, 3.1 million births (49%) out of the 6.4 million pregnancies in 2001 were unintended, whereas 51% were intended (Finer & Henshaw, 2006). Thus, approximately 1 out of every 20 women of reproductive age had an unintended pregnancy in 2001, which was virtually unchanged from rates in 1994. Moreover, the percentage of abortion dropped from 54% in 1994 to 48% in 2001. Consequently, more women with unintended births chose to continue their pregnancies (excluding any fetal demise). These authors acknowledged the existence of disparities among certain demographic groups regarding pregnancy intendedness. Interestingly, lower socioeconomic status was significantly correlated with unintended pregnancy, whereas rates of unintended pregnancy fell significantly as income increased (Finer & Henshaw, 2006).

An additional interesting finding of this research was the impact of relationship/living status on pregnancy intendedness. In 2001, unmarried women cohabiting with a partner were more likely to have an unintended pregnancy (70%), while only 27% of married women had an unintended pregnancy. Notably, cohabiting women were also more likely to have intended pregnancies

than married or never-been-married women (Finer & Henshaw, 2006).

Examining the construct of intendedness becomes important as more women with unintended pregnancies are choosing to carry their pregnancy to term. Therefore, intendedness can influence the self-care behaviors of the expectant mother. Specifically, a woman with an unintended and possibly unwanted pregnancy may not actively seek prenatal care and engage in destructive behaviors such as smoking, consuming alcohol or drugs; all of which can be teratogenic to the developing fetus (Kim et al., 2006).

Pregnancy intendedness is not a fixed construct, meaning expectant mothers' thoughts about the intendedness of the pregnancy can change during the course of the pregnancy (Finer & Henshaw, 2006; Poole, Flowers, Goldenberg, Cliver & McNeal, 2000). In Poole and colleagues' (2000) study of low SES multiparas that were medically high-risk ($N = 1223$), some participants shifted their views when asked about their intendedness from their second trimester to their third trimester. Using chi-square analyses, the authors discovered that of those sampled, 436 women reported their pregnancy as intended, and 601 women endorsed a mistimed pregnancy; 186 women endorsed having an unwanted pregnancy. Particularly, multiparas who reported having a mistimed pregnancy in the second trimester remained consistent in the third trimester (80.9%), while 13.9% moved to the intended group. Of those with unintended pregnancies, 69% remained consistent, while 30.7% changed to mistimed pregnancy, and only 6.4%

shifted their perception to an intended pregnancy. Regarding specific demographic groups, African-American women were more likely than Caucasian women to shift their opinions about the intendedness of their pregnancy in either direction. The authors do point out that their results are not generalizable due to the sample's highly-specific demographic characteristics (Poole et al., 2000).

Regarding pregnancy intendedness and delivery outcomes, Novak-Antolič's (2001) review showed that having a planned pregnancy was negatively correlated with very preterm delivery in Slovenia. Messer, Dole, Kaufman, and Savits (2005) examined the relationships among pregnancy intendedness, perception of adverse events and preterm birth in self-report data from the PIN Study based in North Carolina (November 1996 to February 2001). Most participants were between 24 and 30 weeks' gestation at the time mailed self-report inventories were returned (n = 1908). Interestingly, participants in the "pregnancy unintended" group experienced successively increasing odds of low, medium, and high level of stress associated with adverse life events when compared to those in the intended group. Women in this study with unintended pregnancies were not at a greater risk for experiencing preterm birth.

Pregnancy intendedness may increase anxiety symptoms, especially in women who are later diagnosed with obstetric complications. Gurung and colleagues (2005) add, "not wanting the pregnancy may also lead to negative expectancies that could accentuate the stressfulness of the experience and thereby

increase any adverse physiological consequences of such stress" (p. 500). Surprisingly, research assessing the interaction of pregnancy intendedness and maternal anxiety during pregnancy has scarcely been examined in the existing literature.

Sociodemographic Variables

Austin (2003) highlights the importance of determining the severity of anxiety symptoms experienced by pregnant women including those who are hospitalized, as well as the consideration of the risk factors that could impact the later development of a psychiatric illness. Expectant mothers who possess certain demographic characteristics are at greater risk for developing pregnancy-related complications, in addition to impairment in psychological functioning (Geller et al., 2006; Gurung et al., 2005; Rondó et al., 2003; Williams et al., 2006). Some researchers have challenged the strength of the assertion that demographic variables are only modestly related to anxiety during pregnancy (Littleton, Breitkopf & Berenson, 2006). Andersson and colleagues (2004b) demonstrated a significant positive correlation among the following demographic variables and a diagnosis of anxiety and/or depression in the second trimester of pregnancy: being unmarried/not cohabiting, multiparity, smoking, and having a higher BMI (>30kg/m2). Notably, the incidence of a psychiatric diagnosis was significantly

associated with increased doctor visits during the prenatal period.

Maternal age.

Age is another sociodemographic variable that has been examined in the perinatal literature. More women are able to become pregnant at an older age with the assistance of reproductive technologies, such as in-vitro fertilization, and the risk for genetic and chromosomal anomalies in the fetus increases significantly with the age of the expectant mother (Brisch et al., 2002; Gupton et al., 2001). Advanced maternal age, especially in lower SES groups has been positively related to increased obstetric risk (Martin et al., 2006). In Kurki and colleagues' (2000) previously discussed study, maternal age over 30 years was the only sociodemographic variable associated with preeclampsia. Advanced maternal age of 35 years or older has also been linked to higher rates of stillbirth (Miller, 2005).

Contrastingly, Robb, Alder, and Prescott (2005) contradict the notion that older age contributes to distress during pregnancy. They compared primigravidas who were age 35 years and older with those who were aged 20 to 30 years and discovered no significant differences in the intensity of psychological distress experienced by both groups. In fact, older women experienced less stress than younger women across all three trimesters. It should be noted, however, that parity status might have contributed to this finding. In Gurung and colleagues'

(2005) study, age and race were associated with increasing anxiety among African-American women; particularly, small increases of anxiety occurred concurrently with age increases. The authors report that these two factors accounted for 6% of the variance in stress later in the pregnancy. However, attitudes towards pregnancy and a sense of mastery were significant predictors of changes in prenatal anxiety.

Conversely, some suggest that younger age during pregnancy is related to obstetric complications and anxiety symptoms. Field and colleagues (2006) discovered an increased risk of anxiety and depression among younger women who were less likely to be married, and of lower socioeconomic status. Delivery of a low birth weight (LBW) neonate was correlated with being younger than or equal to 19 years of age in a Brazilian sample ($N = 865$; Rondó et al., 2003). The relationship of age to anxiety during pregnancy appears to be clearly mediated by other demographic characteristics.

Ethnicity / racial background.

As introduced earlier, ethnic and/or racial differences across the experience of pregnancy and associated adverse birth outcomes have been reported in the perinatal literature (Bacak et al., 2005; Dole et al., 2004; Dominguez et al., 2005; Geller et al., 2006; Halbreich, 2005; Williams et al., 2006). Mancuso and colleagues' (2004) published report associated race with

pregnancy-specific anxiety. The 2002 PRAMS Surveillance Report indicated that African-American women, when compared to Hispanic women and Caucasian women, have the highest rates of pregnancy-associated hospitalizations (Williams et al., 2006). African-American women also have a greater chance of experiencing uterine contractility and delivering lower-birth weight infants, in turn, contributes to increased mortality and morbidity when compared to Hispanic women and Caucasian women (Tambyrajia & Mongelli, 2000). Some studies have attributed the presence of ethnic differences to increased psychosocial and environmental stressors such as having experienced adverse life events and heightened perception of racial discrimination as faced by African-American women in the United States (Andersson et al., 2004b; Dole et al., 2004; Rich-Edwards & Grizzard, 2005). Yet, findings relating maternal anxiety to age and race/ethnicity during pregnancy have been inconsistent.

P*arity.*

As the age of a pregnant woman increases, the likelihood that she has already given birth also increases (Brisch et al., 2002; Gupton et al., 2001). Multiparity, defined as multiple previous live births, has been associated with the development of anxiety, obstetric complications, and partner/relationship conflict (DiPietro et al., 2005; Glazier et al., 2004; Rondó et al., 2003). For example, DiPietro and colleagues (2005) demonstrated in a sample of educated women

with uncomplicated pregnancies, that nulliparous mothers expecting their first child were less likely to experience mood disturbance across the pregnancy than women who had previously delivered, even after controlling for maternal age and pre-pregnancy weight when given a stressful cognitive task. Parity status is increasingly significant when a pregnant woman is hospitalized for obstetric risk. Concerns related to distance from partner and other children in the home environment may increase psychological burden. Therefore, multiparity becomes an additional variable that may compound the risk of developing negative psychological sequelae, such as anxiety during pregnancy.

Personal and family history of mental illness.

The DSM-IV-TR (APA, 2000) identifies the predisposition of developing anxiety disorders among first-degree biological relatives. Consequently, assessment of family history of psychiatric illness becomes essential when determining the risk of developing anxiety throughout the pregnancy period, as women are often increasingly vulnerable during this time.

Breitkopf, Primeau, Levine, Olson, Wu, and Berenson (2006) evaluated anxiety symptoms in a lower-income multiethnic sample of expectant mothers between 24 and 36 weeks' gestation, postpartum mothers (2 to 8 weeks), and non-pregnant women in southeast Texas ($N = 807$). No differences were found between pregnant and non-pregnant women regarding anxiety symptoms. Yet, postpartum

mothers had significantly higher state anxiety levels than both the pregnant and non-pregnant women. Importantly, a history of anxiety and/or depression was a significant predictor of state anxiety scores. Through regression analyses, expectant mothers with a psychiatric history positive for anxiety or depression were estimated to have anxiety scores that were 3.75 units higher than women with no psychiatric history. All study participants, notably, sought antenatal care from local clinics. Therefore, this sample may be unique and possibly differ from women of lower SES who did not pursue antenatal care. These authors (Breitkopf et al., 2006) highlight the importance of continuing to assess subthreshold anxiety symptoms, in the absence of meeting full criteria for a psychiatric diagnosis, as they can cause significant impairment without meeting criteria for a psychiatric disorder. Moreover, evidence exists that symptoms may worsen and develop into a significant psychiatric disorder during the transition from pregnancy to postpartum (Andersson et al., 2006; Breitkopf et al., 2006).

Promising results have been published over the last few decades explicating the interrelation of sociodemographic and psychological variables, and the development of anxiety in pregnant women; though obstacles, such as divergent methodological approaches, still remain (Littleton et al., 2006). Thus far, the influence of these variables on anxiety among women hospitalized with high-risk pregnancies has not seen as much empirical exploration.

Delivery Outcomes

Maternal antenatal anxiety has been correlated with complications during the delivery process, increased need for analgesics leading to unplanned caesarean sections, and transport of the neonate to the Neonatal Intensive Care Unit (Saunders, Lobel, Veloso & Meyer, 2006; Teixeira et al., 1999; Zanardo, Freato & Zacchello, 2003). Furthermore, a fear of childbirth and premature contractions, planned caesarean deliveries, and a self-experienced longer time of labor have also been associated with a diagnosis of an anxiety or depressive disorder during pregnancy (Andersson et al., 2004a). Inconsistencies, however, exist among reports of antenatal anxiety and delivery outcomes (Johnson & Slade, 2003). Johnson and Slade (2003) have highlighted these mixed results, finding no relationship among maternal antenatal trait anxiety, fears of childbirth and adverse labor and delivery in their sample of 443 antenatal women in the United Kingdom.

Apgar Scores

A consistent method for analyzing the neonate's response to delivery is determining his or her Apgar score. Virginia Apgar created the Apgar scoring method as a quick assessment of the neonate's clinical status (Apgar, 1953), particularly, the infant's maturity at birth (Williams et al., 2006), the Apgar scoring system has been employed consistently for over 50 years to identify

immediate neonatal risk post-delivery. Scores range from 0 to 10 and are derived by assessing five easily identifiable characteristics of the neonate post-delivery: heart rate, respiratory effort, muscle tone, reflex irritability, and color. The total score consists of the sum the five above-referenced components. A score of 0 to 3 indicates an infant in need of resuscitation; a score of 4 to 6 is considered intermediate; a score of 7 or greater indicates that the neonate is in good to excellent physical condition. A newborn's Apgar score, however, at either 1- or 5-minutes is not indicative of future infant and/or childhood developmental problems (American Association of Pediatrics, 1996).

Berle and colleagues (2005) conducted one of the first large-scale assessments of depression and anxiety disorders in a general health survey in Norway ($N = 680$) and found a significant negative correlation between those diagnosed with an anxiety disorder and Apgar scores at one- and five-minutes after delivery. These researchers stated, "women with an anxiety disorder during pregnancy had an increased risk of an Apgar score below eight at one minute and at five minutes in their offspring with odds ratios of 2.3 and 4.5, respectively compared with women without anxiety disorders" (p. 184). In another study, however, no relationships were found among anxiety disorders, birth weight or gestational length, and Apgar scores, all of which are commonly examined neonatal outcomes (Andersson et al., 2003; Andersson et al., 2004b).

Specific to bed rest during pregnancy, expectant mothers who were on

complete bed rest for 10 days or more had infants with lower Apgar scores at one and five minutes than those who were not on bed rest at all (Maloni et al., 1993). Misri and colleagues (2004) discovered that anxiety symptoms were positively associated with the need for observation of babies after birth. Expectant mothers in this small sample ($N = 46$) had no obstetric/fetal complications ("low-risk") and all were diagnosed with an Axis-I disorder with the use of a clinical interview. Expectant mothers with substance use, psychosis, and/or risk of suicidality were excluded from the study. All study participants were diagnosed with major depression, while 30 women received a comorbid diagnosis of an anxiety disorder: 14 with Panic Disorder only; 11 with Panic Disorder and Obsessive-Compulsive Disorder (OCD) or obsessive-compulsive thinking; and five expectant mothers had multiple disorders including Panic Disorder, OCD and an eating disorder. They also revealed that certain demographic variables were correlated with infant complications, such as marital status (single), receiving social assistance, and alcohol abuse. At entry to the study, expectant mothers with higher anxiety scores were significantly more likely to give birth to an infant that required further observation. Also, receiving a dual diagnosis of depression and anxiety was also linked to those infants further requiring observation post-delivery.

Anxiety symptoms have proven to negatively impact the psychological well-being of women during the perinatal period. Yet, the presence of anxiety

symptoms has rarely been examined in populations of pregnant women with extensive obstetric maternal and/or fetal complications. Furthermore, a paucity of literature exists on the psychological states of expectant mothers who are hospitalized because of their obstetric risk. These antenatal women who have been deemed obstetrically "high-risk" often require constant monitoring of their health and the health of the fetus in utero, thus leading to their hospitalization. The term, high-risk, indicates the susceptibility of a pregnant woman to potential harm to herself, her fetus, or both because of complications associated with her pregnancy (Gray, 2006; Hobel et al., 1973).

Some investigators conducted case studies that qualitatively analyzed the psychological well-being of women who had been hospitalized during their pregnancy (Cohen et al., 1996; Leichtentritt et al., 2005; Maloni et al., 2001; Maloni et al., 1993). Yet, a comprehensive evaluation focused on identifying the psychosocial and medical factors associated with the development and maintenance of anxiety symptoms in a hospitalized antenatal population does not exist in the perinatal literature. This dearth of literature on this highly vulnerable group remains, even though the negative impact of anxiety symptoms and anxiety disorders during and after pregnancy has been established in studies utilizing samples of women with low obstetric risk (Austin et al. 2005; Glover et al., 2004; O'Connor et al., 2005).

Scope of the Current Investigation

The current study attempted to determine the variables related to the onset and continuation of anxiety symptoms in women hospitalized for obstetric risk. Additionally, it sought to distinguish those antenatal women diagnosed with an anxiety disorder from those who do not meet criteria for anxiety disorder, but who do have subthreshold levels of anxiety. Furthermore, this investigation aspired to clarify the vague terminology that persists in the antenatal literature used to explore the presence of anxiety. This aim was accomplished by applying operational definitions to distinguish the intensity of anxiety symptoms as identified by the STAI (Spielberger, 1983) and the SCID Anxiety module (First et al., 2002) among study participants.

The current investigation examined scores associated with the self-report STAI upon admission to the unit and thereafter weekly during hospitalization. Ratings from the clinician-administered SCID were also obtained only from participants who endorsed general anxiety symptoms upon admission. Four descriptive groups were created after the completion of data collection at admission and subsequent once-weekly intervals for each participant:

Group I. Minimal Anxiety (MA)

- STAI subscales, Trait-Anxiety < 41 or State-Anxiety < 42.

Group II. Anxiety Symptomatic (AS)

- STAI subscales, Trait-Anxiety ≥ 41 or State-Anxiety ≥ 42 and

Absence of Anxiety Disorder from the SCID Anxiety Module Administration.

Group III. Anxiety Disorder (AD)

- STAI subscales, Trait-Anxiety ≥ 41 and/or State-Anxiety ≥ 42, and Presence of Anxiety Disorder from the SCID Anxiety Module Administration.

Group IV. Anxiety Symptoms & Disorder (ASD)

- STAI subscales, Trait-Anxiety ≥ 41 or State-Anxiety ≥ 42 including 20 participants not administered the SCID Anxiety Module because of discharge/early delivery.

Further, this current investigation also aimed to assess the impact of anxiety symptoms on the delivery process including complications that directly affect the mother and the infant. The information ascertained through this prospective investigation will provide the foundation and support for developing short-term hospital-based interventions to identify and treat hospitalized antenatal patients who are at greater risk for developing anxiety symptoms and anxiety disorders, thereby potentially reducing postpartum psychological and physical distress.

In the context of the above aims, the following study hypotheses were proposed:

Hypothesis One: The literature has shown that the following demographic

characteristics are associated with the presence of antenatal anxiety symptoms: ethnicity, advanced maternal age, multiparity (multiple previous live births), insurance status, educational attainment, and income (Dominguez et al., 2005; Martin et al., 2006; Rondó et al., 2003; Tambyrajia & Mongelli, 2000; Williams et al., 2006). Therefore, the following hypotheses were proposed:

Hypothesis 1a: African-American participants will endorse more anxiety symptoms than Caucasian or Hispanic participants.

Hypothesis 1b: Multiparas will endorse more anxiety symptoms than nulliparas.

Hypothesis 1c: Participants of advanced maternal age (>35 years of age) will endorse greater anxiety than women ≤ age 35.

Hypothesis 1d: Participants without insurance or receiving government insurance assistance (Medicaid) will experience more anxiety than those participants with private insurance.

Hypothesis 1e: There will be negative correlations between income and anxiety and education level and anxiety among study participants.

Non-parametric chi-square analyses will be used to assess significance of categorical variables that are significantly related to the three groups. One-way analyses of variance (ANOVAs) will be utilized to examine continuous data. Post hoc analyses will be conducted to determine between-group differences.

Hypothesis Two: Relationship distress has been linked to anxiety during

pregnancy (Da Costa et al., 1999; Chapman et al., 1997; Glazier et al., 2004). Therefore, it is predicted that level of dyadic adjustment upon admission to high-risk antenatal unit will differ significantly for the three groups. It is hypothesized that the MA Group will have higher levels of dyadic adjustment (as determined by a score of >100 on the DAS) than the AS and AD groups. ANOVAs and post hoc analyses will be employed to determine if significant group differences exist

Hypothesis Three: Mixed results exist linking the number of stressful life events and anxiety symptoms during the perinatal period (Dole et al., 2004; Dominguez et al., 2005; Heaman & Gupton, 1998). To test whether life event stress impacted anxiety symptoms in this sample, it is hypothesized that the AS and AD groups will have experienced more stressful life events than the MA group. No previous studies examined perceived distress of life events in a high-risk pregnant population. Therefore, it is expected that the AD Group will perceive life events to be more distressing as evaluated by scores on the self-report LESFOG than the MA and AS groups. ANOVAs will be utilized with post hoc analyses to assess specific group differences.

Hypothesis Four: Women who experience an unintended pregnancy may have greater negative perceptions of the pregnancy, and thereby, an increased risk of anxiety (Gurung et al., 2005). The addition of a high-risk diagnosis may compound these negative perceptions. Therefore, it is predicted that the AS and AD groups will have greater unintended pregnancies than the MA group. Chi

square analyses will be employed. Pairwise comparisons will also be used to analyze between group associations.

Hypothesis Five: Empirical evidence provides support that anxiety an often persist across the pregnancy period (Gurung et al., 2005; Roesch et al., 2004), specifically during hospitalization (Leichtentritt et al., 2005). Whereas, other published reports demonstrated a decrease in dysphoric symptoms during hospitalization (Maloni et al., 2002). In the current sample, it is predicted that the AS and AD groups will continue to experience anxiety symptoms during hospitalization as assessed once-weekly with the STAI (State-Anxiety score ≥ 42) until patient discharge from the hospital or delivery. It is assumed that the MA group will continue to obtain scores < 42 on the State-Anxiety during hospitalization. ANOVAs, including a repeated-measures General Linear Model (GLM), will be employed to assess STAI scores for each week of a participant's hospitalization.

Hypothesis Six: The DSM-IV-TR (APA, 2000) highlights the significant comorbidity of depression and anxiety. This correlation has been demonstrated in women (Andersson et al., 2003) and specifically, during the perinatal period (Austin, 2004; Breitkopf et al., 2006). Therefore, it is hypothesized that the AS and AD group scores on the STAI will be positively correlated at all time intervals with self-reported depressive symptoms, assessed by two depression screening measures given concurrently with the STAI State-Anxiety scale: the

EPDS (threshold score of 11) and the CES-D (threshold score of 16). Regression analyses will be employed to assess the relationship among the three measures: STAI, CES-D, and EPDS upon initial admission to the high-risk antenatal unit and once weekly until discharge/delivery.

Hypothesis Seven: Women with high-risk pregnancy have substantial concerns about the integrity of their pregnancies, possibly leading to the development of anxiety (Fisher, 2006; Kurki et al., 2002). Women may have an even greater anxiety response when the risk extends beyond the mother and compromises the health of the developing fetus (Brisch et al., 2002). Participants with maternal obstetric complications are hypothesized to endorse fewer anxiety symptoms as measured by the STAI than participants with fetal complications. Additionally, it is hypothesized that women who have both maternal and fetal obstetric complications will have the highest scores on the State-Anxiety. ANOVAs and post hoc analyses will determine whether between-group differences are present.

Hypothesis Eight: Previous literature discovered mixed results regarding the relationship of delivery outcomes and anxiety (Berle et al., 2005; Johnson & Slade, 2002), although, some studies have published findings demonstrating negative correlations between anxiety and Apgar scores in women with high-risk pregnancy (Maloni et al., 1993). In the current study, it is predicted that the three groups' (MA, AS, and AD) scores on the State-Anxiety will be positively correlated with the following delivery outcomes: cesarean section, presence of

fetal respiratory impairment at delivery, number of maternal complications at delivery as recorded in delivery summary of the patient's medical record, and transport of neonate to neonatal intensive care unit (NICU). Scores on the State-Anxiety for the three groups will be negatively associated with Apgar score at 1- and 5-minute(s) measured on the 10-point Apgar scale as indicated in the delivery summary of the patient's medical record. Chi-square analyses, secondary correlation analyses and ANOVAs were used to examine the data. Post hoc analyses will be conducted to determine between-group differences significant.

Design and Statistical Plan

The current prospective study design examined data collected upon initial admission to the high-risk antenatal unit and at subsequent once-weekly intervals until the patient's discharge or delivery. Initial analyses including chi-squares and one-way ANOVAs were conducted to determine the psychological and medical factors that are significantly associated with those expectant mothers who meet diagnostic criteria for an anxiety disorder, who are anxiety symptomatic, and those who report minimal to no symptoms of anxiety upon admission to the unit. This first analysis attempted to statistically control for the confounding effects of certain demographic characteristics present in the study sample, such as gestational age at admission and whether participants were multiparas or nulliparas.

The major purposes of this investigation were to demonstrate the presence anxiety symptoms in a high-risk hospitalized antenatal population and their relation to delivery outcomes, to determine the risk factors that contribute to the development of anxiety symptoms and anxiety disorders, and to examine the stability of anxiety symptoms across their hospitalizations. A series of repeated-measures ANOVAs were utilized to assess change in the STAI State-Anxiety scores over a period of once-weekly intervals. Additionally, logistic regression analyses and chi-squares were employed to measure the relationship between anxiety and delivery outcome measures. Post hoc analyses also determined whether significant differences existed among the specific groups identified by the STAI and SCID.

Finally, variables demonstrating significant differences among groups were used in logistic regression analyses to determine the risk factors that contributed the most variance to the development of anxiety. Specifically, the first logistic regression evaluated the factors most influential in distinguishing those who are anxiety symptomatic from those participants who have minimal to no anxiety, whereas, the other logistic regression analysis served to differentiate those who meet criteria for an anxiety disorder from those who do not.

Data were analyzed with the Statistical Package for the Social Sciences for Windows, version 12.0. A two-sided alpha level of 0.05 ($p < .05$) determined statistical significance. Cases containing missing data vital to data analysis were

excluded from the analysis. In cases where less than 20% of the instrument used in the analyses contains missing items, the average scores were derived from the completed items and divided by the number of complete answers. The resulting score replaced the missing items(s).

CHAPTER THREE

Methodology

Participants

This investigation recruited participants from an ongoing study at Baylor University Medical Center titled, "The Experience of Being Hospitalized During Pregnancy" (Institutional Review Board, IRB: #005-123). Approximately 166 patients were recruited upon admission to Baylor University Medical Center's high-risk antenatal unit. All patients, regardless of insurance status, were assigned to similar individual occupancy rooms on the unit.

Inclusion criteria.

Expectant mothers admitted to the high-risk antenatal unit with obstetric complications were invited to participate in the study. The research team also approached these women if they were able to read and write in English. Additionally, expectant mothers admitted to the antenatal high-risk unit for a period greater than 72 hours were approached for the study.

Exclusion criteria.

Women unable to communicate verbally or who could not read and write in English were excluded from the study. Additionally, women cognitively impaired, actively suicidal, homicidal, or psychotic were not enrolled in the study.

Further, patients who had an expected discharge plan of 72 hours or less were excluded from the current study, as there was insufficient time for the completion of study measures.

Within-study intervention.

As specified in the IRB approval, those participants who requested additional psychological intervention or expressed suicidal ideation (i.e. verbally expressed, marked a response of 1 or greater on question 10 of the EPDS, or disclosed during SCID administration) were immediately referred to their treating physician and informed of available psychological services by a staff psychologist at Baylor University Medical Center.

Procedure

Time One (1).

A member of the research team who was approved by the IRB's of Baylor University Medical Center and The University of Texas Southwestern Medical Center at Dallas obtained a copy of the antenatal unit's admissions log and census list in order to approach newly admitted patients. A research investigator then conferred with nursing staff assigned to patients to determine length of stay, presence of maternal/fetal complications, and possible discharge plan. Patients meeting inclusion criteria were consented in accordance with the IRB's of Baylor

University Medical Center and The University of Texas Southwestern Medical Center at Dallas. Patients were provided with a written consent form detailing the title of the larger study, study purpose, length of study, risks and benefits, the right to revoke consent, and the confidentiality policy for Baylor University Medical Center. Patients were notified that any identifiable information they provided would be detached from study materials and maintained separately in a locked file cabinet. Additionally, study materials containing patient responses to self-report measures and interviews were also housed in a locked file cabinet behind a locked office door with access only by the research investigators.

During the next 24 hours, a research investigator approached patients who were provided with consent forms and answered any questions or addressed any concerns regarding the study. Also, the research investigator confirmed patients' understanding of study procedures. Upon receipt of informed consent, participants were given a hard copy of their signed consent form for their records. They were assigned a study identification number to de-identify and track their data. Next, a research investigator asked participants predetermined questions from the demographics interview. Participants were provided with the *Time 1* packet of self-report measures to obtain initial admission data. Measures at Time One included the following: the STAI (Spielberger, 1983), Dyadic Adjustment Scale (DAS; Spanier, 1976), Life Event Scales for Obstetric Groups (LESFOG; Barnett et al., 1983), the Edinburgh Postnatal Depression Scale (EPDS; Cox et al.,

1987), and the Centers for Epidemiology Scale for Depression (CES-D; Radloff, 1977). A study research investigator reviewed the patient's medical record to determine the number of maternal and fetal obstetric risk(s). Pregnancy-related complications affecting the expectant mother and/or fetus were assessed through agreement between Jon Rosnes, M.D., principal investigator, and C. Allen Stringer, M.D., to evaluate type and number of risk(s).

Time Two (2).

Study participants were provided with the *Time Two* questionnaire approximately 4 to 7 days after completion of *Time One* and once each subsequent week of during hospitalization until discharge or delivery to assess state anxiety symptoms (STAI, State-Anxiety scale) or how respondents feel "right now, at this moment". State anxiety symptoms were obtained by reverse scoring certain items and then tallying scores (Spielberger, 1983).

Most studies in the literature do not include a clinical interview to further determine the degree of anxiety during pregnancy (Andersson et al., 2003). Therefore, this study sought to correct this methodological limitation. Only participants who met or exceeded a score of 41 on the STAI (Trait-Anxiety scale) at *Time One* were administered the Anxiety module of the "gold-standard" Structured Clinical Interview for the DSM-IV (SCID; First et al., 2002) to assess whether they met diagnostic criteria for an anxiety disorder. The judicious use of

the SCID reduced patient burden and minimized the amount of disruption of clinical care. The SCID was also administered if a study participant did not exceed the threshold on the Trait-Anxiety, but scored ≥ 42 on the State-Anxiety during any administration of *Time Two*. Postdoctoral and doctoral-level clinical psychology graduate students trained in administration of the SCID Anxiety module conducted the clinical diagnostic interviews and met periodically to monitor interrater agreement.

Instruments and Outcome Measures

Demographic interview.

The demographic interview was administered by one of the study research investigators to obtain sociodemographic information including race, level of education, estimated household income, insurance type, presence of previous pregnancy-related complications, trimester associated with patient's awareness of medical complications, concerns about the pregnancy, and personal and familial psychiatric history.

Spielberger State-Trait Anxiety Inventory.

The Spielberger State-Trait Anxiety Inventory (STAI; Spielberger, 1983) is one of the most commonly used instruments to assess levels of anxiety in a plethora of populations (Stanley, Beck & Zebb, 1996). Spielberger (1983) defines

trait anxiety as "…relatively stable individual differences in anxiety proneness, that is to differences between people in the tendency to perceive stressful situation[s] as dangerous and to respond to such situations with elevations in the intensity of their state anxiety reactions" (Spielberger, 1983, p. 5). Spielberger (1983) adds, "Persons, with high T-Anxiety exhibit S-Anxiety elevations more frequently than low T-Anxiety individuals because they tend to interpret a wider range of situations as dangerous or threatening" (p. 6).

The STAI Form-Y is a self-report measure containing 40 items that tap two interrelated dimensions of a person's experience of anxiety. The first 20 items comprises the State-Anxiety scale, which asks respondents to evaluate how they feel "right now, at this moment." The latter 20-item scale (Trait-Anxiety scale) assesses how respondents feel "generally". Each item is rated on a 4-point Likert scale. Several items in both the State-Anxiety and Trait-Anxiety scales were reversed scored to obtain a total score. Based on established norms for General Medical Patients without psychiatric complications (Spielberger, 1983), a mean threshold score of 42 was used for the State-Anxiety scale and mean threshold score of 41 was employed for the Trait-Anxiety scale to distinguish patients with elevated anxiety from those with low anxiety. Furthermore, the creator of the STAI indicated that the State-Anxiety should be used to assess change over time due to its increased sensitivity over the Trait-Anxiety to detect variations in anxiety symptoms.

The STAI has been used extensively in a variety of settings with various populations since its initial development, including being utilized with obstetric patients (Britton, 2005; Huizink et al., 2004).

Dyadic Adjustment Scale.

The Dyadic Adjustment Scale (Levine, Oandasan, Primeau & Berenson, 2003; Spanier, 1976) is possibly the most extensively used measurement of relationship quality in the literature (Graham, Liu & Jeziorski, 2006). The DAS is used to determine level of relationship adjustment in married or cohabiting couples. The DAS contains 32 items that comprise four subscales: Dyadic Consensus (13 items); Dyadic Satisfaction (10 items); Dyadic Cohesion (5 items); and Affective Expression (4 items). This investigation determined the global level of dyadic adjustment among study participants using the DAS total score. A total score of 100 was the threshold score, with those participants scoring below 100 considered to have poor dyadic adjustment (Levine et al., 2003; Spanier, 1976).

Internal consistency for the DAS has ranged from .58 to .96 with a mean Chronbach's α of 0.91. Though this estimate is higher than initially reported by Spanier (1976), it still demonstrates the robustness of the DAS (Graham et al., 2006; Sharpley & Cross, 1982; Spanier & Thompson, 1982).

Life Events Scales for Obstetric Groups.

The Life Event Scales for Obstetric Groups (LESFOG; Barnett et al., 1983) was developed to assess significant life events that extend specifically to pregnant women. The measure was normalized utilizing both primiparas and multiparas to determine the impact of certain life events associated with the perinatal period. This measure attempts to identify the number of certain stressful life events during pregnancy by asking participants to state "yes" or "no if they have experienced the event. Furthermore, expectant mothers are also asked to rate on a Likert scale of 0 to 10 to establish the participants' appraisal of the event as being distressful, regardless if they have experienced said life event. However, only the number of life event stressors concurrent with pregnancy and their accompanied ratings of distress were examined, because of the possibility of reporting bias. The authors of the instrument report a Spearman rank correlation coefficient of +0.92 for combined primiparous and multiparous samples.

Structured Clinical Interview for DSM-IV Axis I Disorders, Research Version.

The semi-structured clinical clinician-administered interview for the DSM-IV (SCID; First et al., 2002) is considered to be the gold standard in assisting the diagnosing of psychiatric disorders (Kessler, Abelson, Demler, Escobar, Gibbon, Guyer et al., 2004) and was administered by the research

investigators to participants who met or exceeded threshold scores on the STAI, EPDS, and CES-D. The SCID contains separate modules for each class of diagnoses; this study only employed the modules that coincided with current study measures used to assess Anxiety Disorders (Module F) and Mood Disorders (Module A). Zanarini and colleagues (2000) reported test-retest reliabilities ranging from .44 (Generalized Anxiety Disorder) to .78 (Post-Traumatic Stress Disorder) across several diagnoses from the Anxiety module. Multiple reliability and validity studies are currently being conducted to establish psychometric properties of the SCID, coinciding with revisions associated with the DSM-IV-TR (APA, 2000; Zanarini et al., 2000).

Edinburgh Postnatal Depression Scale.

The Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987) self-report measure was specifically designed for use in screening depressive symptoms within postpartum populations, but it has also been used extensively during the antenatal period. Participants rate their experience of depressive symptoms over the past seven days on a 4-point Likert scale ranging from 0 to 3. The clinical utility of the EPDS has been adequately demonstrated in both clinical and research settings (Austin, 2003). It was created as a measure that focuses less attention on somatic sequelae, which may be more present during the pregnancy period. The current investigation employed the cut-off score of 11, with higher

scores indicating the presence of more depressive symptomatology. The EPDS has demonstrated good reliability. The authors have reported a split-half reliability of .88 and a Chronbach's α of 0.87 (Cox et al., 1987).

Center for Epidemiological Studies-Depression Scale.

The Center for Epidemiological Studies-Depression Scale (CES-D; Radloff, 1977) is a self-report screening instrument consisting of 20 items was developed to detect depression in community samples. Similar to the EPDS, the CES-D also relies less on assessing somatic complaints, which are frequent in expecting mothers. The CES-D asks respondents to rate questions associated with their mood over the course of the past seven days. Each response is rated on a 4-point Likert scale. This current investigation employed a threshold cutoff score of 16 to determine depressive symptoms. This measure has demonstrated good internal consistency (Chronbach's α = .88 to .91) in studies with perinatal women.

Delivery outcomes.

Delivery outcomes associated with obstetric delivery were obtained by conducting a detailed review of the patients' delivery summaries, when available. Some patients, transported to Baylor University Medical Center for specialized treatment unavailable at their local hospital, were discharged from the high-risk antenatal unit prior to delivery for return to their local hospital. Information

regarding the delivery of these patients was obtained by contacting them by telephone. In some cases follow-up was unsuccessful.

Specific delivery outcomes examined were the neonate's Apgar scores at 1-minute and 5-minutes after delivery and delivery complications. Apgar scores provide a general indication of the neonate's ability to thrive immediately after delivery (Apgar, 1953; Berle et al., 2005; American Association of Pediatrics, 1996). Specific delivery complications were assessed and obtained from the delivery summary and include respiratory issues for the fetus and transport to the Neonatal Intensive Care Unit (NICU). Maternal complications associated with delivery were also investigated. Moreover, data associated with patients who experienced both maternal and fetal complications during delivery were recorded. Agreement between the principal investigator, Jon Rosnes, M.D., and C. Allen Stringer, M.D. determined the appropriate set of delivery complications.

CHAPTER FOUR

Results

From October 2005 to December 2006, 1,128 women admitted to the high-risk antenatal unit at Baylor University Medical Center were evaluated for participation in the current investigation. Of these women, 72% (n = 816) were not approached for the following reasons: 1) women did not meet inclusion criteria of anticipated hospitalization of 72 hours or more (n = 349); or 2) they had already given birth or had other medical concerns unrelated to pregnancy (n = 467). Of the 312 pregravid women eligible for consent, only 35% declined to participate (n = 109). Responses from a total of 166 consenting participants comprised the final database. Approximately, 22% of women who consented (n = 37) were not included in the data analysis. These women had either delivered their child, were discharged with undelivered status, or experienced a fetal demise prior to completion of *Time One*. Interestingly, two of these women withdrew their consent. One woman expressed concern regarding her ability to remain in the study long enough to complete follow-up questionnaires. The other woman who withdrew consent shared her uncertainty in her ability to "think positively" if asked about her psychological state. In sum, the current study consisted of 129 participants. Table 2 provides demographic information for the total sample of 129 participants.

Characteristics of the Sample

Description of the sample.

The sample (n = 129) displayed substantial ethnic diversity, which differs from most research studies investigating obstetric populations. Ethnic composition of the study consisted of the following: Caucasian, 54% (n = 70), African American, 33% (n = 42), Hispanic, 11% (n = 14), and Asian, 2% (n = 2). Study participants ranged in age from 17 to 44 years, with a mean age of 27.63 (SD = 6.40). Approximately 88% of participants (n = 114) were 35 years of age or younger. Married women comprised slightly more than half of the sample (52%, n = 66), 32% (n = 41) were single, 13% (n = 16) were unmarried but living with a partner, and a small percentage of women were separated from their partner/spouse (3%, n = 4). No participants endorsed being divorced or widowed. Over one-quarter of the participants earned an undergraduate degree (28%, n = 35), though, most had only some college experience (35%, n = 44). Approximately, 24% (n = 31) completed high school or had obtained an equivalency degree. A total of 126 participants provided information on their annual household income, which demonstrated a fairly even distribution across the sample. Twenty-nine percent (n = 37) earned an annual average household income exceeding $65,000; 16% ($n$ = 20) earned between $41,000 and $65,000 yearly; 20% ($n$ = 25) earned $26,000 to $40,000, 24% ($n$ = 30) reportedly earned $12,000 to $25,000; and 11% ($n$ = 14) earned less than $12,000 per year. The

sample was almost equally divided regarding insurance coverage for hospitalization. Private insurance covered 48% (n = 61) of the sample; 50% (n = 64) received government support (Medicaid); and only 2% (n = 2) had no insurance.

Pregnancy characteristics.

As displayed in Table 3, women carrying their first pregnancy composed almost one-third of the sample (28%, n = 36) at the time of admission. Twenty-six percent (n = 33) experienced one live birth, 19% (n = 24) endorsed two previous live births, and 36 multiparas indicated that they delivered three or more live neonates (28%). The medical charts of two women did not contain information regarding specific pregnancy data. Among available data, six participants reported that they suffered a previous stillborn delivery (5%) and 41 participants (32%) had a history of miscarriage; ten pregravid women (8%) endorsed previous elective termination. Gestational age at admission ranged from 10.9 weeks to 39.3 weeks (M = 28.19, SD = 5.30). Of those 129 women diagnosed with obstetric complications at admission, almost half reported onset during their third trimester (45%, n = 57), 45 women (36%) revealed onset of complications in their second trimester, and 24 (19%) in their first trimester. No relationship existed between anxiety and the trimester at which obstetric complications began, $\chi^2(4, n = 105) = .86$, $p = .93$. Almost 59% (n = 74) of the

126 responding participants shared that their pregnancy was unplanned and 8% (*n* = 10) considered termination during the course of pregnancy (see Table 4).

Psychiatric characteristics.

Approximately 97% of participants (*n* = 125) provided data on their psychiatric history when interviewed face-to-face by a study investigator. Table 5 provides information on this available data. Ten women (8%) verbally endorsed history of an anxiety disorder, fourteen women (11%) a history of depression, and only one participant (1%) a previous diagnosis of Bipolar Disorder. Five participants (4%) had a comorbid diagnosis of anxiety and depression. Ninety-five participants (76%) denied psychiatric history. Twenty-eight percent (*n* = 35) of antenatal women reported having taken at least one psychiatric medication at some point; 5 women (4%) reported a history of psychiatric hospitalization and 34 women (27%) reported a history of counseling. Almost 30% of participants (*n* = 38) endorsed a positive family psychiatric history. At the time of admission to the antenatal unit, nine patients (7%) reported current use of one or more psychiatric medication(s). During the course of current antenatal hospitalization, five participants were referred by their treating physician for psychological consults.

Table 6 provides information on anxiety and depression screenings and SCID anxiety diagnoses. Antenatal anxiety symptoms were examined utilizing the Spielberger State-Trait Anxiety Inventory (STAI; Spielberger, 1983). One

participant did not complete the STAI State-Anxiety scale. Scores on the State-Anxiety scale ranged from 20 to 68 (M = 40.47, SD = 11.84), while Trait-Anxiety scale scores were very similar (M = 37.72, SD = 10.42; Range: 20 to 69). Figure 4 illustrates the STAI distributions. Women were considered to experience state anxiety if they met or exceeded a threshold score of 42 on the State-Anxiety and trait anxiety if they met or exceeded a score of 41 on the Trait-Anxiety, as derived by the STAI normative sample of general medical patients (Spielberger, 1983). Sixty-nine women (54%) denied experiencing state anxiety at admission, and 46% (n = 51) endorsed state anxiety. Fifty-four participants endorsed general or trait anxiety symptoms at admission (42%).

Responses on the EPDS and CES-D operationalized depressive symptoms. The authors of each measure determined the threshold score used to identify depressive symptoms. The sample displayed an average score of 9.48 on the EPDS (SD = 5.83; Range: 0 to 23). The EPDS provides a threshold score of 11 to determine the presence of depressive symptoms. Approximately, 44% of the total sample (n = 57) met or exceeded this threshold, demonstrating the possible presence of depressive symptoms. In order to strengthen the screening of depression and after obtaining Institutional Review Boards' approvals, the current study's research team added the CES-D several weeks after the initial data collection began. Therefore, 111 participants completed this measure. CES-D scores ranged from 0 to 39 (M = 15.96, SD = 10.10), and participants who scored

16 or higher where considered at high risk of depression (Radloff, 1977). Forty-nine women (44%) met or exceeded this threshold on this measure.

In addition to assessing self-report history of psychiatric disorders and anxiety and depressive symptoms, research investigators evaluated participants for specific DSM-IV anxiety and mood disorder diagnoses if thresholds on anxiety (≥ 41 on Trait-Anxiety scale) and depression screenings (≥ 11 on EPDS; ≥16 on CES-D) were met at either *Time 1* or *Time 2* data collection periods. Spielberger (1983) identified significant stability among Trait-Anxiety scores over several time intervals. The State-Anxiety scale was less stable, indicating its sensitivity to change. In order to alleviate the risk of increased patient burden and interference with clinical care, the Trait-Anxiety scale threshold alone was used as the determinant for baseline SCID (Anxiety module) administration since it would be least affected by initial admission. Sixteen percent (n = 20) did not receive a SCID administration for reasons such as discharge from the unit prior to administration, unavailability due to visitors or medical procedures, and patient requests for postponement of clinical interview because of compromised physical status (e.g. hyperemesis or fatigue). As it was unclear if these participants would have received an anxiety disorder diagnosis, they were excluded from analyses involving comparisons between subjects with and without a diagnosed anxiety disorder. Twelve of 107 participants (11%) met criteria for one or more anxiety disorder(s) as determined by SCID (Anxiety module) administration. Anxiety

disorders found in the sample were Generalized Anxiety Disorder (6%), Post-Traumatic Stress Disorder (6%), Anxiety Disorder Not Otherwise Specified (6%), and multiple anxiety disorder diagnoses (17%; see Table 7). The women who met criteria for an anxiety disorder as determined by the SCID comprised the Anxiety Disorder (AD) group. Those individuals who were administered the SCID and did not receive an anxiety disorder remained in the Anxiety Symptomatic (AS) Group. Thirty-eight participants (36%) comprised the Anxiety Symptomatic group, as they did not meet criteria for an anxiety disorder after SCID administration. The remaining 57 participants (53%) who did not endorse anxiety symptoms comprised the Minimal Anxiety (MA group).

Obstetric risk.

The study investigator recorded a total of 23 obstetric complications as possible diagnoses of maternal and fetal risk. These included the more common diagnoses: preterm labor, premature rupture of membranes, gestational hypertension, placenta previa, insulin dependent diabetes, multiple gestation and preeclampsia, and incompetent cervix. The study sample consisted of a wide range of high-risk diagnoses ($M = 2.56$, $SD = 3.39$, Range: 1 to 12). Upon admission, 35 women were diagnosed with premature rupture of membranes, 56 participants had preterm labor, 36 were diagnosed with an incompetent cervix, and 10 participants experienced undiagnosed bleeding leading to their

hospitalizations. Table 8 provides information on the distribution and frequency of common obstetric complications found in the sample, while Figure 2 displays the mean number of complications experienced by participants. Because of the complex nature of obstetric complications in this unique sample, it was important to determine their source, leading to a diagnosis of high-risk status. As depicted in Table 9, 27% (n = 35) of the study sample experienced complications associated only with the mother's physical health, whereas 66% (n = 85) experienced complications that directly threatened the health of the fetus. Approximately 6% of participants (n = 8) experienced both maternal and fetal health risks.

Psychosocial Measures

Dyadic adjustment.

A total of 116 participants who indicated they were in a committed romantic relationship completed the Dyadic Adjustment Scale (DAS; M = 116.71, SD = 19.09) upon initial admission to the unit. Research investigators requested that participants not in a committed romantic relationship omit this measure when completing *Time 1* data. A DAS score exceeding 100 represents high dyadic adjustment, or minimal relationship distress. Scores of 100 or less reflect low dyadic adjustment, or high relationship distress (Spanier, 1983). Twenty-two participants (19%) scored less than 100 on the DAS. The remaining 81% (n = 94)

endorsed high dyadic adjustment (see Table 10). No significant differences existed among married, single, cohabiting, or separated women and level of dyadic adjustment (p = .74). Reexamination of the data revealed that one participant endorsed significantly high relationship distress with an extreme DAS score of 11.00. Qualitatively, this participant reported being in a relationship at the time of admission, but was in the process of divorcing. Therefore, analyses of the DAS were performed with and without this outlying score. Interestingly, Pearson's chi-square analyses demonstrated significant associations among ethnic groups and level of dyadic adjustment (see Figure 3). Among those with low dyadic adjustment, African American (46%) and Caucasian women (36%) experienced the most relationship distress, followed by Hispanic women (24%; p = .022). Of those with high relationship adjustment, Hispanic participants (n = 58, 64%) were the most well-adjusted in their relationships, followed by African Americans (n = 24, 26%), and lastly, Caucasian women (n = 9, 10%).

Life events.

A total of 120 participants completed the Life Events Scale for Obstetric Groups (LESFOG; Barnett et al., 1983). Two components of the LESFOG were completed by participants: 1) the number of experienced stressful life events (SLE) and 2) ratings of the SLEs' perceived distress, regardless of one's own encounter of the events. As shown in Figure 5, participants experienced a range

of 0 to 20 SLEs (M = 7.71, SD = 4.36). Six participants' scores on the first component of the LESFOG (number of SLEs) were more than two standard deviations above the mean and appeared to influence the range of scores. Table 10 displays the readjusted means and standard deviations of the scores excluding these outlying scores. Both the mean (7.71) and the median (7.00) were employed to create high and low groups of SLE number. Forty-four participants endorsed experiencing SLEs approximately one standard deviation above the mean. Only four participants fell one standard deviation below the mean. As stated, a median split also divided the sample into two groups: high (>7) and low (≤7) number of SLEs. Approximately 56% of participants (n = 66) had a high number of SLEs.

Nearly 85% (n = 113) of the sample completed the perceived distress scale of the LESFOG (M = 266.34, SD = 74.72). The complexity in this measure's instructions may have contributed to the decrease in participant completion rate. The mean, standard deviation and range are displayed in Table 10. Figure 6 provides the distribution of LESFOG perceived distress scores. Notably, seven participants endorsed perceived distress scores of SLEs that fell two or more standard deviations below the sample mean. Analyses of the hypotheses incorporate both data with the outlying scores and without. The readjusted mean, standard deviation, and range are also reported in Table 10. Figure 7 displays the readjusted distribution of perceived distress scores. Low (n = 16) and high (n =

19) perceived distress groups were first created utilizing the LESFOG adjusted sample mean (M = 279.93, SD = 53.75). The two groups (n = 35) were determined by LESFOG perceived distress scores occurring at least one standard deviation below (M = 226.18) and above the mean (M = 333.68), respectively. Additionally, the employment of a median split (Mdn = 280.0) corrected for the possible shift in mean scores caused by extreme scores. Fifty-eight participants (53%) scored 280 or greater on the perception scale of the LESFOG, suggesting a greater number of SLEs perceived as being more distressing than those who scored below the median (n = 50; 47%).

Delivery complications.

Table 11 provides descriptive information about the delivery complications that were present in the current sample. Several reasons account for missing data in the analyses that assess anxiety and delivery complications. Undelivered discharge summaries were obtained for 33 participants. These summaries indicated that patients were discharged from the high-risk antenatal unit without delivering. Qualitative reports from nursing staff revealed that participants would likely be discharged if stabilization of the pregnancy occurred during hospitalization and monitoring could continue outside of the hospital environment, such as bed rest at home or on an outpatient basis. Additionally, transfer of patients to hospitals outside the Dallas area for monitoring after

stabilization of the pregnancy contributed to the number of inaccessible delivery data. These participants were considered discharged without delivery; delivery information on these participants was not available.

Information was available for 100 participants regarding mode of delivery**.** Forty-five percent (n = 58) of antenatal women admitted for high-risk had a cesarean delivery and 33% (n = 42) delivered vaginally. Only eight women (10%) experienced maternal complications at the time of delivery (excluding antenatal diagnosis). Of the available delivery data on respiratory impairment, (n = 78), 35 newborns experienced some respiratory distress. One-minute Apgar scores ranged from 1 to 9 (M = 6.94, SD = 1.94) and 5-minute Apgar scores from 0 to 10 (M = 8.19, SD = 1.84). Furthermore, 48 (65%) of the 74 neonates for whom data was available were transferred to the neonatal intensive care unit (NICU) post-delivery.

Statistical Analyses of Study Hypotheses

The sample of 129 was divided into one of three groups: Minimal Anxiety (MA), Anxiety Symptomatic (AS), and Anxiety Disorder (AD), based on responses to the STAI and SCID Anxiety module administration: MA (n = 57), AS (n = 58), and AD (n = 12). As mentioned previously, those women who met criteria for SCID administration, but were unavailable to complete the SCID were excluded from the analyses involving the MA, AS and AD groups.

In order to examine anxiety from a broader perspective and control for unequal distributions among the three groups (MA, AS, and AD), the AS and AD group were combined and labeled ASD group. The ASD group included members of the AS and AD groups along with the 20 participants who endorsed anxiety symptoms and did not receive the SCID.

Hypothesis 1. The first hypothesis predicted that participants with certain demographic characteristics would have significantly different experiences of anxiety. Specifically, the following variables would be positively associated with elevated anxiety symptoms: African American ethnicity, lower education and income, Medicaid insurance (or lack of private insurance), multiparity, and advanced maternal age (>35 years). Table 12 displays results for this hypothesis.

Hypothesis 1a. To control for limited cell size and test Hypothesis 1a, ethnicity was examined as four categories: Caucasian, African American, Hispanic, and Asian. The primary Pearson's chi-square analysis revealed no relationship between ethnicity and anxiety, $\chi^2(4, n = 107) = 2.27, p = .69$. Ethnic levels were collapsed to account for one or no participants in some cells. African American, Caucasian, and Hispanic women were examined in relation to anxiety. Similar ethnic distributions occurred among the three groups, as approximately half of participants in each group were Caucasian (see Table 12). Caucasian and

Hispanic participants were underrepresented in the sample when compared to Dallas County and U.S. census statistics. The current sample contained 19% fewer Caucasian participants than the Dallas County population and 26% fewer than the United States population. Among Hispanic participants, underrepresentation occurred by 27% as compared to Dallas County and 4% when compared to U.S. census data (U.S. Census Bureau, 2005). No relationships manifested between ethnicity and anxiety after combining the AS and AD groups ($p = .77$).

Hypothesis 1b. Hypothesis 1b predicted group variations in parity. No relationships were found between anxiety (MA, AS, and AD groups) and women experiencing a first pregnancy and those who had previously given birth, $\chi^2(2, n = 107) = .74$, $p = .89$. Pearson's chi-square analyses examining anxiety in women who had delivered only one previous live birth and women who had delivered more than one live birth revealed no significant relationships between parity and anxiety, $\chi^2(4, n = 107) = .31$, $p = .99$. Secondary Pearson's chi-square analyses demonstrated no associations between ASD group membership and the two levels of parity ($p = .95$). When comparing women with no previous births, those with one, and those women with multiple previous births, no associations emerged with regard to anxiety, $\chi^2(2, n = 127) = .77$, $p = .69$.

Hypothesis 1c. Hypothesis 1c predicted that participants of advanced maternal age (>35 years of age) would endorse more anxiety than women ≤ age 35. Pearson's chi-square analyses found no association among women older than 35 years of age and anxiety, $\chi^2(2, n = 107) = 1.52$, $p = .47$ (see Table 12). Secondary Pearson's chi-square analysis comparing women with minimal anxiety (MA group) to those experiencing distressing symptoms of anxiety (ASD group) also revealed no statistically significant relationship between anxiety and maternal age, though a trend emerged ($p = .10$; Fisher's exact, one-tailed). Further, more women older than 35 years of age fell into the MA group ($n = 9$) than the ASD group ($n = 5$). More women, 35 years and younger, fell in the ASD group ($n = 65$, 58%) than in the MA group ($n = 48$, 43%).

To explore this variable in more depth, analyses treated maternal age as a continuous variable. A one-way analysis of variance examining anxiety and maternal age revealed no significant differences ($p = .10$) among the three groups (MA, AS, and AD). Although not significant, a trend emerged suggesting that younger maternal age may be associated with the endorsement of anxiety symptoms. Specifically, maternal age was near equivalent in both the MA ($M = 28.70$, $SD = 6.45$) and AD ($M = 28.25$, $SD = 6.85$) groups. The AS group was slightly younger ($M = 25.82$, $SD = 6.17$) than the other groups. After combining the AD and AS groups, an independent-samples t test neared significance, $t(113) = 1.92$, $p = .058$, with a trend toward participants with minimal anxiety ($M =$

28.70, *SD* = 6.45) being approximately two years older on average than those who were anxiety symptomatic (*M* = 26.57, *SD* = 6.06). Advanced maternal age (> 35 years) was not a significant factor in the experience of anxiety.

Hypothesis 1d. Hypothesis 1d predicted that participants without insurance or receiving Medicaid would experience more anxiety than participants with private insurance. Only one participant in the sample had no insurance coverage and was included in the "Medicaid" category for the continuation of analyses. After comparing insurance status among the MA, AS, and AD groups, a Pearson's chi-square analysis found no associations among the groups and anxiety, $\chi^2(2, n = 106) = 3.39$, $p = .18$. Please see Table 12 for the findings. However, after merging the AS and AD groups (forming the ASD group), a Pearson's chi-square displayed significant relationships in the hypothesized direction ($p = .045$). More participants in the MA group had private insurance (57%, $n = 32$) than those who had Medicaid (43%, $n = 24$). The AS group contained significantly larger percentage of Medicaid participants (61%), as well.

Hypothesis 1e. Hypothesis 1e posited that the AS and AD groups would have lower household income and less educational attainment than the MA group. Merging the levels of household income to create three levels ($0 to $25,000; $26,000 to $65,000; and over $65,000) corrected for one or no participants in the

cells during the analysis. The first Pearson's chi-square analysis revealed a significant association between income level and anxiety, $\chi^2(4, n = 105) = 10.74$, $p = .03$. The AD group contained 11% ($n = 4$) of income earners of $25,000 annually or less, followed by the MA (44.4%, $n = 16$) and AS groups (44%, $n = 16$), which were equivalent. Among participants earning between $26,000 and $65,000, most comprised the AS group (47.4%, $n = 18$). The MA (42.1%, $n = 16$) and AD (11%, $n = 4$) groups included fewer people in this income range. Among women with annual incomes greater than $65,000, the AD and AS groups were equivalent (13%, $n = 4$), with the MA group (74%, $n = 23$) consisting of the highest income earners.

Follow-up pairwise comparisons evaluated the difference among the three anxiety groups (see Table 13). The Holm's sequential Bonferroni method controlled for Type I error at the .05 level across all three comparisons. A significantly larger proportion of participants who earned over $65,000 appeared in the MA group (74%). Those earning over $65,000 experienced significantly less anxiety symptoms than those who earned from $0 to 25,000 and $26,000 to $65,000. No significant associations emerged with regard to the two lower income groups ($p = 1.0$).

Pearson's chi-square analyses initially demonstrated no support for a relationship between educational attainment and anxiety, $\chi^2(8, n = 106) = 6.89$, $p = .55$. Educational attainment was re-evaluated comparing women with no

education through high school graduates/equivalence degree to college graduates and women with some college experience. Resulting chi-square analyses approached significance ($p = .10$). The MA group contained more college graduates and those who had some college experience (52%) than the AS (38%) and AD groups (10%). The AS group had a higher percentage of women with education up to a high-school diploma/GED (60%) than the MA (28%) and AD groups (12%).

Pearson's chi-square analyses evaluated the broader relationship between anxiety symptoms and education after combining the AD and AS groups. This association reached significance in the predicted direction, $\chi^2(1, n = 125) = 4.14$, $p = .04$. Expectant mothers with lower level of education experienced more anxiety than those with more education.

Hypothesis 2. The second hypothesis predicted that level of dyadic adjustment upon admission would differ significantly among the three groups; where the MA group would have higher levels of relationship adjustment (as determined by a score of >100 on the DAS) than the AS and AD groups. Pearson's chi-square analysis revealed that the AS group (61%, $n = 11$) experienced the most relationship distress, followed by the AD group (22%, $n = 4$), and the MA group (17%, $n = 3$). The MA group contained 63% ($n = 50$) of those endorsing positive relationship adjustment, followed by the 36 participants

(28%) in the AS group. The AD group had only 9% of the participants reporting being well-adjusted in their relationships, $\chi^2(2, n = 97) = 12.91, p = .002$. Secondary Pearson's chi-square analyses utilizing the ASD group provided the same support for Hypothesis 2 ($p = .001$). The ASD group (86%) contained more women who endorsed relationship discord than the MA group (14%).

A one-way analysis of variance evaluated the association between DAS scores and group designation, demonstrating significant differences in total DAS scores among the groups, $F(2, 97) = 5.19, p = .007$ (equal variances not assumed; see Figure 8). Table 14 displays these results. Post hoc analyses, conducted with the Dunnett's C test ($p < .05$), indicated that the AS group ($M = 110.75$, $SD = 23.94$) experienced significantly more relationship distress than the MA group ($M = 123.08$, $SD = 13.11$; $p = .01$).

Post hoc analyses found no significant difference between the MA and AD groups and AD and AS groups. The second hypothesis also predicted higher mean DAS scores in the MA group ($M = 123.08$, $SD = 13.11$) than in the AD group. As shown in Figure 4, the difference between the AD ($M = 111.09$, $SD = 23.18$) group and MA group ($M = 123.08$, $SD = 13.11$) approached significance ($p = .13$). Furthermore, the AD group did not differ significantly from the AS group ($p = .10$; see Table 15).

One participant's total DAS score equaled an 11.00, falling approximately five standard deviations below the sample mean. Qualitatively, this participant

reported that she was in a relationship at the time of admission, but was in the process of divorcing. A one-way analysis of variance excluding this extreme score still supported the inverse association between anxiety symptoms and dyadic adjustment, $F(2, 93) = 4.99$, $p = .009$. Dunnett's C post hoc analysis demonstrated that the MA group ($M = 123.08$, $SD = 13.11$) consistently scored significantly higher than the AS group ($M = 113.86$, $SD = 16.19$), indicating more relationship adjustment ($p = .025$). Figure 6 displays this relationship. Interestingly, the AD group's DAS scores ($M = 11.09$, $SD = 23.18$) trended toward being significantly different from MA group scores. Specifically, the AD group appeared to have a small decrease in DAS scores, representing more relationship distress ($p = .06$). No significant differences in DAS scores emerged between the AS and AD groups (see Table 16).

Finally, when examining the MA and ASD groups, independent-samples t tests revealed a significant difference, $t(112) = 3.39$, $p = .001$ (equal variances not assumed). Continued support for this hypothesis remained after excluding the outlier, $t(111) = 3.37$, $p = .001$ (equal variances not assumed). The ASD group ($M = 113.11$, $SD = 17.65$) averaged 9.97 points lower than the MA group ($M = 123.08$, $SD = 13.11$).

Hypothesis 3. The third hypothesis predicted that the AS and AD groups would have undergone more stressful life events than the MA group as measured

by the LESFOG. The primary univariate analysis of variance compared the three groups with self-reported number of stressful life events and determined an approach toward significance in the total number of stressful life events, $F(2, 101) = 1.53$, $p = .22$ (see Table 17). Next, an independent-samples t test comparing pregravid women with distressing anxiety symptoms (ASD group) and without (MA group) uncovered significant differences between the two groups, $t(115.22) = -2.68$, $p = .021$. Participants in the MA group ($M = 7.22$, $SD = 5.80$) endorsed 2.7 less stressful life events than those in the AS group ($M = 9.90$, $SD = 6.51$).

As shown in Figure 9, six participants reported encountering a number of SLEs exceeding two standard deviations above the mean, as recorded by the LESFOG ($M = 8.74$, $SD = 6.33$). A univariate analysis of variance controlling for outlying scores showed a significant positive correlation between number of stressful life events and anxiety ($p = .01$; equal variances not assumed). The MA group ($M = 6.28$, $SD = 3.13$) endorsed the least amount of SLEs, followed by the AS ($M = 8.74$, $SD = 4.80$) and AD groups ($M = 9.20$, $SD = 5.32$; Figure 10). Results from the univariate analysis of variance are provided in Table 18. Table 19 contains results from the Dunnett's C post hoc analyses. Specifically, the MA and AS groups significantly differed from one another in the number of stressful life events experiences ($p = .017$). The AD group did not differ from either MA or AS group, though, the AD group trended towards endorsing significantly more SLEs than the MA group ($p = .11$).

Hypothesis 3 also predicted that the AD group would perceive stressful life events to be more distressing than the MA and AS groups, as evaluated by higher scores on the LESFOG, regardless of whether participants had experienced such events. The initial univariate analysis of variance testing this relationship partially supported this hypothesis, $F(2, 109) = 6.65$, $p = .002$ (see Table 20). Tukey post hoc analyses, utilized because equal variances were assumed, showed that the MA group perceived stressful life events as less distressing than the AS group. Conversely, the AD group surprisingly scored the lowest on perceived distress of SLEs, though not significantly different from the AS ($p = .17$) and the MA groups ($p = .97$), as displayed in Table 21. Furthermore, an independent-samples t test also supported this hypothesis when combining the AD and AS groups. The average perceived SLE distress score in the MA group was 38.40 points less than the ASD group, $t(110) = -2.79$, $p = .006$.

As previously mentioned, seven participants endorsed LESFOG perception scores nearly five standard deviations below the mean. Secondary analyses excluded these scores. Results from the secondary univariate analysis of variance were comparable to those previously found ($p = 002$). Once more, the MA group's ($M = 261.84$, $SD = 51.12$) perceived distress scores were significantly lower than the AS group's ($M = 298.21$, $SD = 50.67$) scores. Again, the AD group did not differ from the MA group. Table 22 presents the means, standard deviations and pairwise comparisons pertaining to Hypothesis 3. Tukey

post hoc comparisons, moreover, showed that the AS group statistically differed from both the MA (p = .003) and AD (p = .038) groups, a finding that was not present in the primary analyses. Specifically, the AD group (M = 256.01, SD = 43.51) endorsed significantly lower perceived distress of SLEs than the AS group (M = 302.00, SD = 51.61). The AD group also averaged lower scores than the MA group (M = 262.10, SD = 51.27).

After combining the AD and AS groups to address possible diagnostic confounds and outliers, the independent-samples t test exploring LESFOG perception scores once more reached significance, $t(103) = -3.35$, p = .001. The ASD group (M = 295.67, SD = 50.88) continued to perceive stressful life events as more distressing than the MA group (M = 262.10, SD = 51.27).

Hypothesis 4. Hypothesis 4 predicted that the AS and AD groups would have more unintended pregnancies than the MA group. Responses to the following two questions assessed pregnancy intendedness: "Was your pregnancy planned?" and "Did you consider termination?" Responding "yes" to these questions operationalized the presence of unintended pregnancy. Pearson's chi-square analyses revealed no relationship between pregnancy planning and anxiety $\chi^2(2, n = 106) = .40$, p = .82. In addition, no associations surfaced when comparing the MA and ASD group and pregnancy planning, $\chi^2(1, n = 124) = .27$, p = .60.

Pearson's chi-square analyses looked at group membership and the consideration of pregnancy termination. Pearson's chi-square analysis revealed near significant group associations in the predicted direction among the three groups when considering termination of the pregnancy (p = .055). Particularly, more women who considered termination comprised the AS group (see Table 23). Yet, several cells contained less than three participants. Subsequently, Pearson's chi-square analyses comparing the MA and ASD groups and the consideration of termination found statistical significance, $\chi^2(1, n = 124) = 5.43$, p = .019 (Fisher's exact; one-tailed). The proportion of participants who considered termination was greater for those endorsing anxiety symptoms (90%) than for those who did not (10%). Notably, only one participant who considered termination fell in the MA group. Table 24 displays these findings.

Hypothesis 5. The fifth hypothesis predicted that the AS and AD groups would continue to experience anxiety symptoms during hospitalization as assessed once-weekly with the State-Anxiety until discharged from the hospital or delivery. The MA group would continue to obtain State-Anxiety scores below the threshold of 42 during hospitalization. Table 24 presents the means, standard deviations, and ranges of State-Anxiety scores across once-weekly assessments during hospitalization. Hospitalization for one week or greater following initial admission occurred for 33% of study participants (n = 42), making them available

to complete *Time 2* measures including the State-Anxiety scale, CES-D, and EPDS (see Figure 11). Table 25 depicts the change in length of stay as hospitalization continued, while Figure 12 represents group progressions in State-Anxiety scores across the twelve weeks of available data.

Repeated measures general linear model (GLM) at admission and each subsequent one-week interval examined length of stay of hospitalization on anxiety symptoms, as measured by the State-Anxiety scale. Because so few participants were hospitalized longer than five weeks ($n = 8$), repeated measures GLM was limited to week five including baseline admission ($n = 8$). Prior to the GLM repeated measures analysis, Mauchly's Test of Sphericity indicated that no violations to the assumption of had occurred, $\chi^2(9, n = 11) = 13.16$, $p = .17$. The results of the repeated measures GLM revealed no within-group differences in State-Anxiety scores and length of hospitalization, Wilks's $\Lambda = .63$, $F(4, 5) = .73$, $p = .61$, partial $\eta^2 = .37$. Results also did not find an interaction effect between group membership and scores across course of hospitalization (see Figure 12), Wilks's $\Lambda = .35$, $F(8, 10) = .86$, $p = .58$, partial $\eta^2 = .41$.

To account for so few participants being hospitalized beyond five weeks, exploratory repeated measures GLM accounted for missing data by extending the last score obtained during participants' hospitalization by one additional week ($n = 16$). Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated with this approach, $\chi^2(9, n = 16) = 23.88$, $p = .005$. Therefore,

Greenhouse-Geisser adjustments were made to the degrees of freedom utilized in this analysis. This analysis found non-significant results. Again, the repeated measures GLM indicated that length of hospitalization did not have a significant effect on anxiety, Wilks's $\Lambda = .54$, $F(8, 20) = .87$, $p = .55$. Pairwise comparisons were not conducted due to the absence of group differences. Table 26 provides the mean values and standard deviations for this analysis.

A repeated measures GLM examined possible differences between the MA and ASD groups and length of hospitalization at initial admission, the second and fifth weeks of hospitalization. This analysis revealed no significant findings, though an interaction trend surfaced, Wilks's $\Lambda = .48$, $F(2, 71) = 2.71$, $p = .16$ (see Figure 14). At admission, the MA group averaged much higher State-Anxiety scores than the ASD. By Week 2 of hospitalization, the two groups appeared to endorse similar rates of low anxiety scores (MA group: $M = 31.20$, $SD = 13.24$; ASD group: $M = 31.33$, $SD = 5.69$). By Week 5, the ASD group ($M = 28.33$, $SD = 7.77$) scored slightly lower than the MA group ($M = 29.60$, $SD = 9.04$) on the State-Anxiety. Notably, scores for both groups remained below threshold (≥ 42) by Week 2.

Hypothesis 6. The sixth hypothesis predicted that the AS and AD groups' scores on the State-Anxiety will be positively correlated at all time intervals including initial admission and once-weekly follow-up during hospitalization with

self-reported experiences of depressive symptoms as assessed by two depression screening measures provided concurrently with the State-Anxiety scale of the STAI: the EPDS (threshold score of ≥ 11) and the CES-D (threshold score of ≥ 16). Pearson's correlation coefficients computed among admissions scores for the State-Anxiety, CES-D, and EPDS are presented in Table 27. The Bonferroni approach to control for Type I error across the six correlations required a *p* value of less than .008 for significance. Resultant coefficients demonstrated significant strong correlations ($p < .01$, one-tailed) at admission among the State-Anxiety, CES-D ($r = .68$), and EPDS ($r = .60$). Figures 15 and 16 depict the bivariate relationships between State-Anxiety and the CES-D and State-Anxiety and the EPDS. Results support that anxiety is positively correlated with depressive symptoms at admission to the high-risk antenatal unit.

Next, statistical analyses examined the relationship of anxiety and depression across four weeks of hospitalization after initial admission. Table 28 exhibits the means and standard deviations of the three measures at admission at these weekly time-points. Specifically, Pearson's correlation coefficients validated the positive relationship between scores on depression screening measures and State-Anxiety scores. Among all pregravid women hospitalized for four weeks beyond admission, once-weekly State-Anxiety scores were positively correlated with the CES-D ($r = .60$ to $.92$) and EPDS ($r = .63$ to $.90$) until the fourth week post-admission. As illustrated in Table 29, the strength of the

correlation between CES-D and State-Anxiety scores weakened until the fourth week, where they were no longer significantly related (r = .41, p = .06; one-tailed). A more varied pattern prevailed with the first week's State-Anxiety scores and EPDS scores by Week 4 (r = .42, p = .07; one-tailed). The relationships among State-Anxiety scores and the depression measures varied more across weekly intervals, though significance remained until the fourth week.

Binary logistic regression analyses determined the predictive values of the CES-D and EPDS in distinguishing group membership (MA or ASD groups). These analyses provided support for the predicted effect of the CES-D and EPDS until the third week following admission. The .10 and .15 levels established the entry and removal criteria, respectively. First, the regression model entered the EPDS alone, followed by both the CES-D and EPDS. Lastly, the model entered the CES-D alone. At the first week of hospitalization following admission, women with elevated EPDS scores were significantly more likely to endorse anxiety symptoms (OR = 1.36, 95% CI = 1.14 - 1.62). However, when entered together in the model's second step, elevated CES-D scores alone predicted the endorsement of anxiety symptoms (OR = 1.34, 95% CI = 1.02 - 1.77; see Table 30). Again, the CES-D, as shown in Table 31, predicted ASD group membership at the second week of hospitalization (p = .001). By the third week of hospitalization, CES-D scores still predicted membership in the ASD group (100% classified into the ASD group; see Table 32). The CES-D no longer

predicted group membership by the fourth week of hospitalization (0% percent classified into ASD group; $p = .62$).

Hypothesis 7. The seventh hypothesis predicted that participants with only maternal obstetric complications would endorse less anxiety symptoms as measured by the STAI than participants with fetal complications. Additionally, those coping with a diagnosis of both maternal and fetal complications were expected to experience the most anxiety symptoms. Pearson's chi-square analysis revealed relationships among membership in anxiety group (MA, AS, and AD) and type of obstetric complication, $\chi^2(4, n = 107) = 12.01, p = .017$. Though this relationship was significant, combining the three levels of obstetric complication (maternal, fetal or both) type to create two levels (maternal only and maternal/fetal) corrected for several cells containing one or no participant(s). Pearson's chi-square analysis demonstrated support for this hypothesis, $\chi^2(2, n = 107) = 9.39, p = .009$. Specifically, the AD group contained more participants experiencing both maternal and fetal complications (92%, $n = 11$) than those with maternal-specific complications (8%, $n = 1$). Participants in the AS group were also more likely to experience maternal/fetal complications (89%, $n = 34$) than risks only to the mother's health (11%, $n = 4$). Interestingly, MA group participants also experienced more risks to both the mother and fetus (65%, $n = 37$) than to the mother alone (35%, $n = 20$). Again, disparities in cell size may

have contributed to this finding. An additional Pearson's chi-square comparing women who experienced distressing anxiety symptoms (ASD group) with those who did not (MA group), surprisingly, no longer supported significant associations among anxiety and the three types of obstetric risk (maternal, fetal, and maternal/fetal), $\chi^2(2, n = 107) = 2.81, p = .25$. Yet, the relationship approached significance after including women with only fetal risk with those with both maternal and fetal complications, $\chi^2(1, n = 107) = 2.78, p = .07$.

A one-way analysis of variance examined type of risk (maternal, fetal, or maternal/fetal) and anxiety in more depth. This analysis, using State-Anxiety scores, showed that those with fetal risk had higher mean scores than women with only maternal complications and those with maternal/fetal complications. Yet, this found no significance, ($p = .18$). Table 33 illustrates these results. Notably, the substantially unequal distribution of participants among the three levels of obstetric complication type may have impacted the findings. A secondary independent-samples t test subsequently examined obstetric complication type (maternal only and maternal/fetal) treating anxiety as a continuous variable (State-Anxiety scale). The resulting analysis again revealed non-significant differences among complication type and anxiety, $t(125) = 1.49, p = .14$.

Delivery Complications and Anxiety

Hypothesis 8. The eighth and final hypothesis proposed that the three groups' scores on the STAI would be positively linked with the following delivery outcomes: cesarean delivery, presence of fetal respiratory impairment at delivery, number of maternal complications at delivery, and transport of the neonate to the neonatal intensive care unit (NICU). When testing this hypothesis, Pearson's chi-square analyses revealed no relationships among the MA, AS, and AD groups and the type of delivery (cesarean section), presence of fetal respiratory impairment at delivery, and transport to the NICU (see Table 34). Among those with cesarean deliveries, 26 participants fell in the MA group, followed by the AS (n = 11) and AD (n = 7) groups, respectively. Additionally, only seven out of 63 women experienced maternal complications at delivery; small sample size most likely contributed to the lack of relationships among group membership and this complication. Pearson's chi-square analysis utilizing the MA and ASD groups also substantiated the lack of associations between the outlined delivery outcomes and anxiety. Table 35 displays the results from these analyses.

Next, univariate analyses of variance tested group membership and Apgar scores of participants' neonates at 1- and 5-minutes. Results of these analyses found no group differences among Apgar scores and anxiety group at either 1-minute (p = .87) or at 5-minutes (p = .53). Notably, Apgar scores were virtually

the same for each group (MA, AS, and AD) at 1- and 5-minutes (see Table 34). Finally, independent-samples t test compared the two groups' (MA and ASD) Apgar scores at both minute intervals. Not surprisingly, analyses found no significant differences between the MA and ASD groups (1-minute: $p = .84$; 5-minutes: $p = .67$). As previously discovered, the MA and ASD groups obtained similar Apgar scores at both time points (see Table 35).

Exploratory Analyses

Predictors of Anxiety

In addition to exploration of the primary hypotheses, the current investigation employed logistic regression analyses to evaluate the factors that most contributed to anxiety symptoms when hospitalized with a high-risk pregnancy. Specifically, forward binary logistic regression analyses were conducted to predict ASD group affiliation from demographic characteristics and psychosocial well-being. Similar to the previous regression analyses, a p value of .10 and .15 determined the entry and removal criteria in the model, respectively. The first regression analysis included demographic characteristics previously found to be significantly associated with meeting or exceeding threshold on the State-Anxiety in the primary statistical analyses. These categorical predictor variables for anxiety were household income, educational attainment, and insurance status. Maternal age was entered as a continuous variable, along with

psychosocial measures: DAS, LESFOG, EPDS, and CES-D, and the consideration of terminating the pregnancy. Demographic characteristics were not significant predictors of State-Anxiety scores. In fact, the regression model only included the EPDS and CES-D into the logistic regression.

Similar to the previous analysis of Hypothesis six, the regression model entered the EPDS alone, followed by the CES-D in the second step. The model shows State-Anxiety scores are almost 1.6 times likely to increase with EPDS scores (OR = 1.56, 95% CI: 1.30 - 1.87, $p < .000$). When the CES-D entered the model on the second step, the likelihood in predicting State-Anxiety scores with the two depression screens decreased slightly, though both the EPDS (OR = 1.32, 95% CI: 1.08 - 1.62, $p = .007$) and CES-D (OR = 1.27, 95% CI: 1.07 - 1.52, $p = .007$) remained significant predictors (see Table 36).

CHAPTER FIVE

Discussion and Future Direction

Limited understanding of the factors contributing to the onset and maintenance of anxiety in women hospitalized with high-risk pregnancy, an often-overlooked group, served as the impetus for the present prospective investigation. To date, most research has largely focused on women with uncomplicated pregnancies. The goal of this particular study was to specifically examine the occurrence and course of anxiety symptoms and anxiety disorders in women hospitalized with high-risk pregnancy. To extend existing perinatal research, the current investigation also included those variables previously shown in published reports to contribute to the development of anxiety. These variables included demographic characteristics and psychosocial functioning, as well as factors directly associated with high-risk pregnancy status. Literature on this unique group of women who experience complex pregnancies also pointed to relationship adjustment, pregnancy intendedness, and the impact of stressful life events on the development of anxiety during the perinatal period. The current study attempted to determine the effect of these variables in women hospitalized with obstetric complications.

This study also aimed to clearly operationalize the anxiety experience, which varied greatly in previous research. The utilization of the Spielberger State-Trait Anxiety Inventory (First et al., 2002) to obtain reports of anxiety

accomplished this goal.

Characteristics of the Sample

Description of Sample

The diversity of the current study's sample, consisting of 129 antenatal women with high-risk pregnancies admitted to Baylor University Medical Center, was considerably greater than the ethnic composition of most studies in the perinatal literature. Prior investigations primarily consisted of Caucasian, middle-class, married women with low-risk pregnancies. Notably, the ethnic diversity in the present sample was somewhat comparable to the ethnic composition of Dallas County (U.S. Census Bureau, 2005), even though overrepresentation occurred among African-American women, constituting approximately one-third (33%) of the sample. African Americans comprise 21% of Dallas County and only 13% of the United States population. Giurgescu and colleagues' (2006) investigation of high-risk pregnancy identified a similar distribution of African-American women (38%). Hispanic and Caucasian women in this study were underrepresented when compared with Dallas County census data.

Congruent with other studies investigating both low- and high-risk pregnancies, participants in the current study averaged 27 years of age (Dominguez et al., 2005; Dulude et al., 2002; Gray, 2006; Gurung et al., 2005; Kelly et al., 2001). The youngest woman in this sample was hospitalized at age

17 with high-risk pregnancy. Other studies also focused their research on married women with and without a previous birth (Heaman, 1992; Maloni et al., 2001; Leitchentritt et al., 2002). For instance, Da Costa and colleagues (1999) utilized marital status or involvement in a stable relationship as an inclusion criterion in their examination of anxiety and pregnancy-related stress. The current study, though, was more evenly distributed regarding marital status. Married participants comprised more than half of the sample, while 32% endorsed single status, and 13% reported cohabiting with a significant other. In 2006, Giurgescu and co-authors discovered similar representations of marital status in women with high-risk pregnancy.

Educational attainment was spread evenly across the sample, as approximately a third of study participants had some college experience, and 28% earned a college degree. Almost a quarter of participants completed high school or earned an equivalency degree, approximating that of the recent Dallas County census (U.S. Census Bureau, 2005). Participants had more college experience than Dallas County residents; similarly, antenatal women with less than a high school diploma were overrepresented in the study (n = 48, 38%).

The extensive diversity in the sample, including the distribution of ethnicity, marital status, income and educational attainment significantly strengthens the current investigation. Previous literature associated demographic status with high-risk pregnancy status and the development of anxiety symptoms.

Other investigations noted single marital status (Finer & Henshaw, 2006) and limited access to medical care because of economic disadvantages (Kim et al., 2006) contributed to anxiety symptoms. This study is compelling because it is the first to include women with obstetric complications who are not only diverse because of their obstetric risk, but also as a result of their sociodemographic characteristics.

Increasing hospitalization costs associated with the management of high-risk pregnancy can become a substantial worry for the patient when she requires close monitoring of the pregnancy in a hospital setting (Williams et al., 2006). In the current investigation, private insurance served as the payment source for 48% of study participants, while Medicaid covered hospitalization costs for 50%. These distributions of payment sources associated with pregnancy-specific hospitalizations are similar to the percentages found in the 1999-2000 National Hospital Discharge Survey (Bacak et al., 2005).

Pregnancy characteristics.

The present investigation accounted for parity status, a variable previously examined in other studies. Parity varied among participants at initial admission. Nearly one-third of study participants were experiencing a first pregnancy. Thirty-three women had one previous birth, 24 previously delivered one or more neonate(s), and 36 women had more than three previous deliveries. Therefore,

the results regarding the relationship between parity and anxiety could be ascertained. As discussed in the earlier review of literature, existing research studies widely varied in the stage of gestation in which antenatal women with high-risk pregnancy have been examined. Interestingly, almost 59% (n = 74) of the sample had an unplanned pregnancy, a larger percentage (34%) than found among women with complicated pregnancies in Gupton and colleagues' 2001 published investigation. Finer and Hinshaw (2006) asserted that 44% of antenatal women who had unintended pregnancy chose to carry the pregnancy to term; this figure excludes women with unintended pregnancies who eventually terminated the pregnancy. To date, no published reports have assessed the existence of a relationship among high-risk pregnancy status, anxiety symptoms, and pregnancy intendedness. Pregnancy intendedness, though, has not been evaluated among high-risk pregravid women (Poole et al., 2000).

Psychiatric characteristics.

Though not a direct focus of the current investigation, previous psychiatric history has shown to significantly affect a woman's experience of her own pregnancy (Breitkopf et al., 2006). A small number of women (n = 10, 8%) in the present investigation reported a history of an anxiety disorder, although a significant percentage (28%) of participants reported taking at least one psychiatric medication. This difference is noteworthy, as some women may

receive psychopharmacological interventions for psychological distress without being clinically diagnosed with a psychiatric disorder. Some women may even underreport their experience of psychological distress. Eleven percent experienced depression in the past and only one participant endorsed a diagnosis of Bipolar Disorder. Again, only five participants disclosed self-reported comorbid diagnoses of depression and anxiety; another five reported previous psychiatric hospitalizations.

The STAI, used to operationalize the experience of both situational and general anxiety symptoms, distinguished participants based on threshold scores (State-Anxiety scale ≥ 42; Trait-Anxiety scale ≥ 41). Commensurate with Rondó and colleagues (2003) findings of anxiety symptoms in 26% to 53% of women across the three trimesters of the pregnancy, 44% of women in the current study met or exceeded threshold on the Trait-Anxiety, thus endorsing anxiety symptoms upon admission to the antenatal unit. The SCID Anxiety module administration followed endorsement of anxiety symptoms on the Trait-Anxiety scale. Results were congruent with other published reports of anxiety disorders, ranging from 0.3% to 10% in antenatal populations (Adewuya et al., 2006), though less than found in the general population. The SCID discovered slightly more participants ($n = 12$, 9%) who received an anxiety disorder diagnosis than those who verbally endorsed a history of anxiety disorder.

Obstetric risk.

According to Martin-Arafeh and colleagues (1999), diagnoses of high-risk pregnancy occur in 20% to 25% of pregravid women. Dependent on multiple factors, a pregnant woman could experience obstetric complications at any point during her pregnancy. Though women in the current sample received high-risk diagnoses at various gestational ages (10.9 to 39.3 weeks), almost half of the participants in the current study reported experiencing onset of obstetric complications during the third trimester. The broad range of gestational age-at-admission in the current study strengthens this investigation, as most studies select a narrow window of gestational age to examine anxiety during the perinatal period. Within the current sample, the number of high-risk diagnoses also varied greatly (Range: 1 to 12).

The most common diagnoses outlined by the PRAMS survey (Williams et al., 2006) were present in the sample, including preterm labor, premature rupture of membranes, gestational hypertension, gestational and insulin-controlled diabetes, multiple gestation, and preeclampsia. Preterm labor occurred more frequently among study participants, followed by premature rupture of membranes. Prevalence rates of premature rupture of membranes ranged in the literature from 3% to 10% (Medina & Hill, 2006; Mu, 2004). A large percentage, 27% (n = 35), of the current sample, however, was diagnosed with this severe obstetric complication. Regarding complications associated with fetal

development, the Center for Disease Control indicates that approximately 3% of pregnancies in the U.S. result in birth defects (MWMR, 2007). Interestingly, 8 women (6%) had both maternal and fetal complications, while 66% had complications only associated with the fetus. Twenty-seven percent maintained diagnoses affecting only the health of the mother.

Psychosocial Factors

Dyadic adjustment.

Participants primarily endorsed positive dyadic adjustment (81%) compared to those who endorsed relationship discord (19%). Interestingly, chi-square analyses revealed a significant relationship between ethnicity and relationship adjustment as predicted by scores on the Dyadic Adjustment Scale (Spanier, 1976). African-American women in a committed relationship were more likely than any other ethnic group to experience relationship distress or maladjustment. Further examination of the data revealed an additional significant relationship between ethnicity and income, with African-American women being lower household income earners (53%; $25,000 or less). Research supports that relationship maladjustment in this population may be more related to the combination of variables, such as lack of financial resources and coping with hospitalization, rather than ethnicity alone (Chapman et al., 1997; Martin-Arafeh et al., 1999). Furthermore, African-American participants were also more likely

to be single than married or cohabiting compared to their Caucasian and Hispanic counterparts. Married women comprised only 33% of those surveyed in Dominguez and colleagues' (2005) study centered on stress in African-American pregnancies; yet, the remaining two-thirds cohabited with the baby's father.

Stressful life events.

Participants in the current study endorsed experiencing a higher number of stressful life events ($M = 7.71$, $SD = 4.36$) than reported in earlier investigations (Gurung et al., 2005). Gurung and colleagues (2005) found that antenatal women in their study experienced a range of 0 to 17 SLEs with an average of 5.89. Chapman and colleagues (1997) utilized an adaptation of the LESFOG in their study and revealed an average of 2.68 fewer SLEs in their sample among inner-city pregravid women compared to the present investigation. Chapman and co-authors (1997) did not ask participants to rate perceived distress of the LEFOG items.

Perceived distress scores on the LESFOG scores also ranged from 16 to 405 ($M = 266.34$, $SD = 74.72$; $Mdn = 280.0$). This psychosocial instrument asked participants to endorse or deny whether they experienced each SLE from a list of 41 items, and also asked them to rate the perceived distress of all items in the measure on a scale from 0 to 10. The number of items and the expansive scale (0 to 10) most likely accounted for the large difference in participants' ratings.

Furthermore, items in the LESFOG range in the intensity of the life event. For instance, one item asks whether raters previously miscarried. Another item asks participants to confirm or deny whether they have had trouble with their blood pressure. Therefore, perceived distress scores on this scale may be unduly inflated by differences in the valence of the items. Several participants, moreover, reported difficulties in completing the perception scale of the LESFOG; lack of understanding of the item content or the instructions possibly confounded their ratings of items.

Delivery Complications

Not all women enrolled in the study delivered at Baylor University Medical Center. However, medical charts including delivery summaries provided mode of delivery information for 100 participants. The sample displayed near-equal distributions across cesarean delivery (45%) and vaginal delivery (33%). Forty-five percent of newborns delivered from participants experienced some respiratory distress at delivery. Andersson et al. (2004b) found significantly less fetal respiratory distress (3%) in their sample of women with anxiety and/or depression. The same study also had fewer neonates (10%) born to women with anxiety and/or depression who were transferred to the NICU than the current study (65%). Andersson and colleagues' (2004b) investigation, notably, focused on women with low-risk pregnancy. Therefore, compromised health status of

both the mother and the fetus in this high-risk sample could have directly influenced delivery outcomes. Apgar scores at 1- (M = 6.94, SD = 1.94) and 5-minutes (M = 8.19, SD = 1.84) in the current investigation were lower than those reported in Berle and colleagues' (2005) Norwegian population-based study (1-minute: M = 8.63, SD = 1.03; 5-minutes: M = 9.12, SD = .87). High-risk status, again, may have impacted these differences in scores. They also noted that their findings could be "biased towards the healthier among pregnant women…" based on their extensive sample size (n = 680; p. 181).

Examination of Hypotheses

Demographic Characteristics and Anxiety

During the primary stage of statistical analyses, the present study discovered partial support for the first hypothesis. No significant relationships were observed when evaluating anxiety symptoms and ethnic background. The current sample agreed with several other reports that did not find a link between these two variables (Chapman et al., 1997; Mancuso et al., 2004; Roesch et al., 2004). Additionally, the experience of anxiety did not differ between women pregnant with their first child and those who had previously delivered, as hypothesized. This finding paralleled Canals and colleagues' (2002) published results.

The current investigation also revealed no association between advanced

maternal age (> 35 years) and anxiety group membership. The lack of a relationship possibly could have been caused by the large sample size differences between the two categories of maternal age (≤ 35 years, 88%; >35 years, 12%) in the sample. Notably, the relationship between maternal age and anxiety was significant when treating age as a continuous variable. The trend suggests that expectant mothers, younger by almost three years (M = 26.22, SD = 5.89), may endorse more anxiety than their slightly older counterparts (M = 28.70, SD = 6.45). Reports in the literature support this interesting, though not hypothesized, result (Glazier et al., 2004; Gurung et al., 2005; Robb et al., 2005). For example, Glazier and colleagues (2004) found an inverse relationship among anxiety, depressive symptoms, and age in their community sample of 2,052 antenatal women. Older women may have more established support systems, possible previous experience with childbirth and child-rearing, and less role shifts than women of younger age. The demands on a younger woman may expand, especially during the management of high-risk pregnancy, which could possibly increase her vulnerability to anxiety symptoms. Again, further research could elucidate this relationship.

Analyses yielded significant associations between insurance status and anxiety symptoms in women hospitalized with high-risk pregnancy. More women in the MA group were covered through private insurance (57%) than Medicaid (61%). Consistent with other reports, results demonstrated that

antenatal women with private insurance experience less anxiety (Bacak et al., 2005; Clauson, 1996; Glazier et al., 2004; Williams et al., 2006). Specifically, women with private insurance have greater access to healthcare than their pregnant counterparts who either self-pay or rely on government assistance, such as Medicaid. The uncertainty of medical coverage and significant financial burden compounded with the management of a complicated pregnancy would appear to significantly contribute to an antenatal woman's anxiety.

Similar to insurance status, both income level and educational attainment were inversely related to anxiety. Lower-wage earners, specifically those earning less than $65,000, distinctly reported more anxiety symptoms than those earning more than $65,000. No differences were found among women who earned up to $65,000 and those earning less annually. Women with some college experience or who were college graduates, moreover, reported less anxiety symptoms than those with less education. It stands to reason that education and income considerably contribute to a woman's access to economic and healthcare resources and perinatal care (Gurung et al., 2005).

Psychosocial Correlates of Anxiety

Dyadic adjustment and anxiety.

Previous research established that a distressing relationship could lead to anxiety during the pregnancy period. Additionally, perceived lack of support

from a romantic partner, as indicated by relationship discordance, negatively impacted the expectant mother's own experience of her pregnancy (Clauson, 1996; Mercer & Ferketich, 1988). Findings of the present investigation are consistent with other reports, in that limited partner support and relationship dissonance increased the risk of anxiety symptoms (Chapman et al., 1997; Glazier et al., 2004). Da Costa and colleagues (1999) also linked relationship discord to pregnancy-specific stress and state anxiety in the third trimester. Participants in the current study's MA group were significantly more adjusted in their relationships (M = 123.08, SD = 13.11) than those in the AS group (M = 110.75, SD = 23.93). Notably, women diagnosed with an anxiety disorder (M = 111.09, SD = 13.18) differed from the AS group by an average of one point on the DAS. An explanation of this finding could be that women faced with obstetric complications are able to receive both emotional and instrumental support from a partner. Caution should be taken when examining the relationship between dyadic adjustment and anxiety. Although these variables were negatively correlated, causality cannot be assumed. It is possible that an expectant mother's anxiety symptoms in the form of excessive worry, confusion, and fears may impair her or her partner's ability to maintain positive interactions with one another. Plausibly, future studies could attempt to further investigate this clinically valuable hypothesis. Above and beyond the concurrence of these results with other studies, the current examination is only the second to

investigate the relationship of dyadic adjustment and anxiety in women hospitalized with obstetric complications (Dulude et al., 2002).

Stressful life events and anxiety.

According to the Surgeon General's report (DHHS, 1999), certain populations are more susceptible to negative psychological sequelae of stressful life events. It reasons that women requiring increased surveillance of their obstetrically complicated pregnancies are more vulnerable to the emotional impact of stressful life events because of their compromised health status (Rostad & Schei, 1998; Yali & Lobel, 1999). The LESFOG utilized in this study extends beyond several existing life events measures, because it incorporates a range of general events, as well as those specific to pregnancy. Initial results employing this measure did not reach significance when evaluating the impact of stressful life events and anxiety, as predicted. However, a trend surfaced in the hypothesized direction ($p = .22$). The small number of participants diagnosed with an anxiety disorder with the SCID ($n = 12$) may have contributed to lack of significant findings when comparing the number of stressful life events and anxiety.

When reinvestigating the difference between the MA and ASD groups, significant differences emerged ($p = .021$). Specifically, women with little or no anxiety at admission endorsed 2.68 fewer stressful life events than those

experiencing anxiety symptoms. Group differences remained even after controlling for the impact of outlying scores. Gurung and colleagues (2005) employed a different measure of stressful life events than the one used in the current study. They, nevertheless, discovered a similar positive relationship between number of stressful life events and experience of anxiety during the prenatal period in an ethnically diverse sample of 453 antenatal women in the Los Angeles area. Additionally, Glazier and co-authors (2004) found that lack of social support mediated the influence of stressful life events in low-risk pregnant women.

Few studies in the literature have scrutinized the relationship of perceived life stress to maternal antenatal anxiety in either low- or high-risk pregnancy (Heaman, 1992). The current investigation predicted and supported previous findings that antenatal women's perceptions of life events as distressing are positively correlated with the endorsement of anxiety symptoms. In 60 women hospitalized with a diagnosis of pregnancy-induced hypertension during their third trimester, Heaman (1992) observed a strong correlation (r = .43) between negative life events and anxiety.

Specific to the experience of high-risk pregnancy as a stressful life event, Lobel and colleagues (2002) surmised that a sense of mastery within the pregnancy was inversely related to the presence of distress. However, women with obstetric complications in the current study may be uncertain about their

health and the health of the fetus and are, therefore, more sensitive to the distressing nature of life events presented in the LESFOG. Women who were least anxious perceived these life events as being less distressing than AS group. Shockingly, women with anxiety disorder diagnoses trended towards perceiving said events as being the least distressing out of all three groups. One would expect that women with anxiety disorders would perceive their environment as being more frightening and hostile than women not coping with anxiety. However, this rationale does not appear to fit the data. Perhaps women in the sample experienced increased security within the confines of the hospital when completing the LESFOG, such as more attentiveness by nursing staff and physicians to address pregnancy-related concerns. One's home environment may not provide such accessibility and therefore, contribute to greater perceived distress of general and pregnancy-specific events. Moreover, size difference across groups also may have contributed to this unexpected finding.

Pregnancy intendedness and anxiety.

Two questions in the current study measured pregnancy intendedness: "Was your pregnancy planned?" and "Did you consider termination?" Results of this analysis revealed no relationship between pregnancy planning and anxiety in women hospitalized with high-risk ($p = .60$). Interestingly, women who previously considered termination endorsed anxiety symptoms ($p = .019$). It is

possible that women who had unplanned pregnancy did not regard their pregnancy as "unwanted." These participants, speculatively, may have endorsed a mistimed pregnancy, but gradually accepted the pregnancy over the course of gestation and developed associated positive feelings.

Conversely, Gurung et al. (2005) pointed out that perceived unwanted pregnancies might precipitate anxiety, especially when pregnancy-related complications arise. Messer and colleagues (2005) also discovered a positive relationship between unintended pregnancy and perceived stress. One can infer that women who considered termination may doubt their decisions to continue the pregnancy due to the added stress of coping with high-risk. Yet, this study did not assess how often participants considered terminating or the reasons leading them to carry their pregnancy to term. Poole and co-authors (2000) discovered shifts in pregnancy intendedness over time. Particularly, women who previously reported having an unintended pregnancy shifted their perceptions in either direction, from "unwanted" pregnancy to "mistimed" or "wanted." As previously stated, investigating these possible shifts across the perinatal period extend beyond the scope of this study.

Course of Anxiety during Hospitalization

State anxiety across hospitalization and comorbid depression.

Of the 129 participants, only 33% of the participants continued their

hospitalization one-week after initial admission. This percentage declined each consecutive week of *Time 2* collection of State-Anxiety scores. By week four, only 12 antenatal women remained hospitalized from baseline. Analyses could not be completed beyond this data point because of the lack of participants remaining hospitalized. Interestingly, White and Ritchie (1984) examined the same number of women hospitalized with complicated pregnancies and detected heightened stress in those hospitalized longer than two weeks. Contrary to this previous report, length of hospitalization in the current sample did not affect anxiety scores. In fact, the MA and ASD groups did not differ based on their State-Anxiety scores at each weekly interval. White and Ritchie's (1984) investigation rated items specifically designed to identify stressors directly related to the hospitalization, such as communicating with healthcare professionals, separation from loved ones, and health status related to the pregnancy. In the current study, the items of the State-Anxiety tap into more general anxiety symptoms, possibly contributing to the conflicting findings with other studies (Britton, 2005; Gurung et al., 2005; Roesch et al., 2004). Because so few women in the AD group remained hospitalized post-admission, differences across the three groups could not be examined effectively. A significant interaction trend, however, did emerge when examining group differences (MA and ASD groups) of State-Anxiety scores at admission, Week 2, and Week 5 ($p = .16$). As women approached the second week of hospitalization, those experiencing distressing

anxiety (M = 31.33, SD = 5.69) actually averaged similar State-Anxiety scores as those with minimal or no anxiety (M = 31.20, SD = 13.25). By the fifth week, anxiety symptomatic women scored slightly lower than those with minimal anxiety.

Scores for both the MA and ASD groups remained below threshold across hospitalization after initial admission. Substantial advances in healthcare that address and manage high-risk pregnancy could have positively impacted participants' pregnancy experience, thereby reducing the risk of developing anxiety symptoms as hospitalization continued. For example, Heaman and Gupton's (1998) qualitative accounts of women hospitalized with complicated pregnancies revealed the presence of dysphoric feelings during hospitalization, such as loneliness; yet, perceived benefits of hospital-based surveillance ranged from close proximity to physicians to the support and education provided by nursing staff. Moreover, participants at Baylor University Medical Center were admitted to individual occupancy rooms and provided with resources, such as occupational therapy and arts and crafts projects, if requested. Therefore, simulation of the home environment and access to stress-reducing interventions across hospitalization may also contribute to a decrease in anxiety.

Hypothesis six predicted that patients endorsing anxiety symptoms would experience comorbid depressive symptoms, as determined by the EPDS and CES-D. Initial Pearson correlation coefficients demonstrated strong positive

relationships among the two measures and the State-Anxiety scale across four weeks of hospitalization. When predicting group membership, a binary logistic regression analysis revealed that depression, in fact, predicted State-Anxiety scores until the fourth week after admission. This significant finding is congruent with current knowledge reported in the DSM-IV-TR (APA, 2000) of the comorbidity of anxiety and depression.

Other literature reviews corroborate the importance of identifying depressive symptoms when looking at anxiety due to the functional impairment caused by both symptom presentations (Austin, 2004; Breitkopf et al., 2006). Authors also discovered positive correlations of anxiety and depression in pregravid women (Field et al., 2006). It is conceivable that screening for both anxiety and depressive symptoms may help medical and mental healthcare practitioners fully address the psychosocial needs of the antenatal woman coping with high-risk pregnancy.

Obstetric complications and anxiety symptoms.

The seventh hypothesis predicted group distinctions in anxiety among women who differ in the nature of their obstetric risk. It posited that women aware of risks to both their health and that of the fetus would endorse the highest level of anxiety, followed by those with risks only to the fetus. Women with only maternal complications would endorse the least amount of anxiety. Analyses of

variance and independent-samples t tests revealed significant differences among the three groups. As predicted, participants who faced additional fetal complications appeared to experience greater anxiety than those with only maternal complications. Future studies incorporating antenatal women with elevated risk of fetal abnormality in the study by design, such as Brisch and colleagues' (2002) investigation, would further shed light on the factors that contribute directly to increased anxiety in women with both maternal and fetal complications.

Delivery Complications and Anxiety

The final hypothesis predicted significant correlations among anxiety and several delivery complications often examined in the perinatal literature. Primary Pearson chi-square analyses revealed no significant associations among anxiety group membership and cesarean delivery, fetal respiratory distress, number of maternal delivery complications, and neonatal transport to the NICU. The lack of relationships remained even after investigating anxiety symptoms alone, rather than participants with anxiety disorders as a separate group. The non-significant results of this current study concur with Littleton et al.'s (2006) recent meta-analysis on neonatal outcomes. These authors point to variations in study design and discrepant sample sizes found in the perinatal literature that directly impact the likelihood of finding significant results. Though, previous studies discovered

relationships among Apgar scores and anxiety (Berle et al., 2005), analyses of differences in anxiety and Apgar scores at 1- and 5-minute(s) yielded no significant results in the current study. Several reasons could account for this lack of relationship. The number of available delivery summaries was limited (n = 81), as several participants were discharged prior to delivering. Additionally, Maloni and colleagues (1993) reported that an increase in the length of hospitalization signals the possible improved health and stability of the fetus and developing pregnancy. Therefore, participants in the current investigation who delivered may have had significant improvement in health status associated with increased medical attention and care during hospitalization.

Limitations

Small sample size most likely played a significant role in the ability to detect differences among women diagnosed with an anxiety disorder, those who were only symptomatic, and women with minimal anxiety during hospitalization for high-risk pregnancy. Approximately, twelve of 107 participants (11%) endorsed an anxiety disorder in the current investigation. In order to detect 50 participants with anxiety disorders, this study would need to recruit approximately 450 women with high-risk pregnancy. As part of a larger study, recruitment efforts relied on the openness of the participants and their willingness for continued involvement on a longitudinal basis. Therefore, differences in

psychological state, such as severity of anxiety or depressive symptoms, may have existed between those who agreed to participate and those who declined. Moreover, patient burden proved to be an important consideration when conducting research with this vulnerable population. The goal of reducing this burden impacted the administration of the SCID. However, most studies examining women hospitalized with high-risk pregnancy only utilize self-report measures. Therefore the use of the SCID, though limited, adds to the methodological rigor of the current investigation.

The lack of a clinical comparison group also limited the current study. In some high-risk perinatal studies, investigations utilized a low-risk control group of pregravid women. This study, deemed as a pilot investigation, lays the groundwork to incorporate such a design model in future examinations to determine whether the significant experiences of anxiety in this sample are exclusive to antenatal women hospitalized with high-risk. Furthermore, this investigation utilized a convenience sample, where participants were recruited from one site (Baylor University Medical Center) for study participation. Therefore, results are less generalizable to other obstetric groups hospitalized with high-risk pregnancy in other regions. Future research employing a similar model of incorporating both self-report measures and clinical interviews to assess anxiety in a multi-site format would address this limitation.

Conclusions

The current examination discovered significant relationships among anxiety symptoms and anxiety disorders and lower household income, Medicaid insurance status, less education, relationship maladjustment, number and perceived distress of stressful life events, consideration of termination, and endorsed depressive symptoms in women hospitalized with high-risk pregnancy. This study clearly met its established aims of clarifying operational definitions of perinatal anxiety with the STAI and SCID (Anxiety module). Lastly, the current investigation determined that depressive symptoms were predictive of anxiety symptoms across five weeks of hospitalization.

Women who are hospitalized for obstetric complications face a wide array of physical and psychological issues including separation from family and coping with compromised health status of the mother and possibly the fetus. Existing reports also highlight the significant negative impact of anxiety symptoms and anxiety disorders on the development of the fetus and childhood outcomes. This study is pivotal to the perinatal literature, in that it significantly contributes to the understanding of psychological functioning of women hospitalized with obstetric risk, a population that is significantly understudied. Specifically, this investigation is one of the first to examine anxiety in women hospitalized with high-risk pregnancy while incorporating a structured clinical interview concurrently with anxiety and depressive screening measures. Additionally, it is

only the second investigation demonstrating the impact of relationship maladjustment on anxiety in women with high-risk pregnancy. Thirdly, this study is one of the only existing examinations of pregnancy intendedness in women with high-risk pregnancy.

Furthermore, the awareness that anxiety significantly impacts a woman's experience of her obstetrically complicated pregnancy lays the foundation for interventions that directly focus on prevention and intervention of such symptoms.

Clinical Implications

Several clinical implications emerged from the current investigation. Specifically, providing multidisciplinary education to hospital staff of the demographic and psychosocial risk factors associated with anxiety may lead to greater identification of women in need of psychological intervention. Additionally, integrated routine screenings of anxiety and depressive symptoms into the admissions process should be the standard of care. Furthermore, hospital staff may prevent anxiety by incorporating a family-based model of treatment that includes the expectant mother's support system, such as her partner or spouse, in the management of her high-risk pregnancy. Such measures serve to reduce relationship distress, increase knowledge, and ultimately reduce anxiety in women hospitalized with high-risk pregnancy.

TABLES

Table 1

*Apgar Score: Five Components and Score Definitions**

Component	Score 0	1	2
Heart rate, beats/min	Absent	Slow (<100)	>100
Respirations	Absent	Weak cry, hypoventilation	Good, strong cry
Muscle tone	Limp	Some flexion	Active motion
Reflex irritability	No response	Grimace	Cry or active withdrawal
Color	Blue or pale	Body pink, extremities blue	Completely pink

Note. *Cited from American Academy of Pediatrics (1996).

Table 2

*Demographic Characteristics of the Sample (n = 129)**

Variable	All Subjects	
	M (SD)	*Range*
Maternal age	27.63 (6.40)	17 to 44
	n	*%*
Maternal age		
≤ 35 years	114	88.4
> 35 years	15	11.6
Ethnicity		
African American	42	32.6
Caucasian	70	54.3
Hispanic	14	10.9
Asian	2	1.6
Other	1	0.8
Marital Status *(n = 127)*		
Single	41	32.3
Married	66	51.0
Separated	4	10.9
Cohabiting	16	12.6

(table continues)

*Note: *n* represents available data on participants who consented to participate in study. Does not include participants who consented, but were discharged or delivered prior to completing study measures.

Table 2 cont.

Variable	All Subjects	
	n	*%*
Education *(n = 127)*		
Under 9	1	0.8
9 – 12	16	12.6
High School or Equivalent	31	24.4
Some College	44	34.5
Undergraduate degree	35	27.6
Occupational Status *(n = 126)*		
Unemployed	50	39.7
On Leave	36	28.6
Employed part-time	8	6.2
Employed full-time	32	25.4
Undergraduate degree	35	27.6
Average Household Income *(n = 126)*		
Under $12,000	14	11.1
$12,000-25,000	30	23.8
$26,000-40,000	25	19.8
$41,000-65,000	20	15.9
Over $65,000	37	29.4

(table continues)

Table 2 cont.

Variable	All Subjects	
	n	*%*
Medical Cost Coverage *(n = 127)*		
No Insurance	2	1.6
Private Insurance	61	48.0
Medicaid	64	50.4

Table 3

Pregnancy Characteristics of the Sample (n = 125)

Variable	All Subjects	
	n	%
Previous Pregnancy		
No prior pregnancy	36	27.9
One previous pregnancy	33	25.6
Two previous pregnancies	24	18.6
Three or more previous pregnancies	36	27.9
History of stillborn delivery	6	4.7
Previous elective abortions	10	7.8
History of miscarriage	41	32.3
Onset of obstetric complication at admission		
First trimester	24	19.0
Second trimester	45	35.7
Third trimester	57	45.2
Complications with previous pregnancy		
Yes	55	43.3
No	71	55.9

Table 4

Pregnancy Intendedness of the Sample (n = 127)

Variable	All Subjects	
	n	%
Pregnancy Intendedness		
Unplanned pregnancy *(n = 127)*	74	58.7
Considered termination *(n = 126)*	10	7.7

Table 5

Psychiatric Characteristics of the Sample (n = 125)

Variable	All Subjects	
	n	%
Previous Psychiatric History		
Anxiety	10	8.0
Depression	14	11.2
Comorbid Mood and Anxiety Disorders	5	4.0
Bipolar Disorder	1	0.8
None	95	76.0
Previous Psychiatric Medication	35	27.1
Previous Psychiatric Hospitalization	5	3.9
Previous Counseling	34	26.4
Current Psychiatric Medication	9	7.2
Family History of Psychiatric Illness		
Yes	38	30.4
No	87	69.6

Table 6

Distributions of Anxiety and Depression Measures

Variable	All Subjects	
	M (SD)	*Range*
Positive Screening for Anxiety at Admission		
STAI State-Anxiety (*n=128)*	40.47 (11.84)	20 to 68
STAI Trait-Anxiety (*n=129)*	37.72 (10.42)	20 to 69
Positive Screening for Depression at Admission		
CES-D (*n* = 111)	15.96 (10.10)	0 to 39
EPDS (*n* = 129)	9.48 (5.83)	0 to 23
	n	%
Anxiety Threshold at Admission		
STAI State-Anxiety (score $\geq$ 42) (*n=128)*	59	46.1
STAI Trait-Anxiety (score $\geq$ 41) (*n=129)*	54	41.9
Positive Screening for Depression at Admission		
CES-D (score $\geq$ 16)	49	44.1
EPDS (score $\geq$ 11)	57	44.2
SCID Administration		
No diagnosis	23	65.7
Diagnosis of one or more anxiety disorder	12	9.3

Table 7

Anxiety Disorder Diagnoses in Sample among Participants Administered the SCID

Variable	All Subjects	
	n	%
Anxiety Disorder Diagnosis		
Generalized Anxiety Disorder	2	5.7
Post-Traumatic Stress Disorder	2	5.7
Anxiety Disorder Not Otherwise Specified	2	5.7
Multiple Anxiety Disorder Diagnoses	6	17.1

Table 8

Type of Obstetric Risks in the Sample (n = 129)

Variable	All Subjects	
	n	%
Type of Complication		
Premature rupture of membranes	35	27.6
Preeclampsia	16	12.5
Gestational hypertension	11	8.6
Preterm labor	56	43.8
Vaginal spotting or undiagnosed bleeding	10	7.8
Diabetes		
Gestational	5	3.9
Insulin-dependent	7	5.5
Multiple gestation	17	13.3

Table 9

Number of Obstetric Risks in the Sample (n = 127)

Variable	All Subjects	
	n	%
Type of Complication		
Maternal complication	35	93.7
Fetal complication	84	1.6
Both maternal and fetal complications	8	4.8

Table 10

Psychosocial Measures of the Current Investigation

Measure	All Subjects	
	M	*SD*
Dyadic Adjustment Scale (*n* = 116)	116.71	19.09
LESFOG (*n* = 120)		
Number of Stressful Life Events (SLE)	8.74	6.33
Adjusted Number of Stressful Life Events (*n* = 114)	7.71	4.36
Perception of SLE as Distressful	266.34	74.72
Adjusted Perception SLE as Distressful	279.93	53.75
	n	*%*
Dyadic Adjustment		
Low dyadic adjustment	22	19.0
High dyadic adjustment	94	81.0
LESFOG		
High SLE number (> 7 SLEs)	66	56.4
Low SLE number (≤ 7 SLEs)	51	43.6
High SLE number – 1 SD above mean	44	91.7
Low SLE number – 1 SD below mean	4	8.3

(table continues)

Table 10 cont.

Variable	All Subjects	
	n	%
High Perceived SLE (> 280.0)	56	52.8
Low perceived SLE (≤ 280.0)	50	47.2
High perceived SLE – 1 SD above mean	16	45.7
Low perceived SLE – 1 SD below mean	19	54.3

Table 11

Delivery Complications among Study Participants

Variable	All Subjects		
	n	*%*	
Cesarean delivery			
Cesarean	58	45.0	
Vaginal	42	32.6	
Fetal respiratory impairment	35	44.9	
Maternal delivery complications	8	10.0	
Transport to NICU	48	64.9	
	M	*SD*	*Range*
Apgar scores			
1-minute	6.94	1.94	1 to 8
5-minutes	8.19	1.84	0 to 10

Table 12

Descriptive Statistics and Significance Levels for Demographic Characteristics

Variable	Group				
	MA	AS	AD	Statistic	*p*
	M (SD)	*M (SD)*	*M (SD)*		
Age	28.70 (6.45)	25.82 (6.17)	28.25 (6.85)	$F(2, 104) = 2.39$	.10
	n (%)	*n (%)*	*n (%)*		
Race				$\chi^2(4, n = 106) = 2.41$	.66
Caucasian	7 (12.3)	4 (10.8)	2 (16.7)	-	-
African American	17 (29.8)	16 (43.2)	3 (25.0)	-	-
Hispanic	33 (57.9)	17 (45.9)	7 (58.3)	-	-
Age				$\chi^2(2, n = 107) = 1.52$	.47
≤ 35 years	48 (51.1)	35 (37.2)	11 (11.7)	-	-
> 35 years	9 (69.2)	3 (23.1)	1 (7.7)	-	-
Parity				$F(2, 124) = .24$	.89
Nulliparas	16 (51.6)	12 (38.7)	3 (9.7)	-	-
Multiparas	41 (53.9)	26 (34.2)	9 (11.8)	-	-

(table continues)

Table 12 cont.

Variable	Group				
	MA	AS	AD	Statistic	*p*
	n (%)	*n (%)*	*n (%)*		
Income				$\chi^2(4, n = 105) = 10.73$	.03*
$0 to $25,000	16 (44.4)	16 (44.4)	4 (11.1)	-	-
$26,000 to $65,000	16 (42.1)	18 (47.4)	4 (10.5)	-	-
Over $65,000	23 (74.2)	4 (12.9)	4 (12.9)	-	-
Education				$\chi^2(2, n = 106) = 4.54$	.10
Less than 9th grade to HS diploma / GED	16 (28.6)	19 (50.0)	4 (33.3)	-	-
Some college to college graduate	40 (71.4)	19 (50.9)	8 (66.7)	-	-
Insurance				$\chi^2(2, n = 125) = 3.38$	.18
Private insurance	32 (57.1)	16 (42.1)	4 (33.3)	-	-
Medicaid/no insurance	24 (42.9)	22 (57.9)	8 (66.7)	-	-

*$p < .05$

Table 13

Pairwise Comparisons of Household Income Using the Holm's Sequential Bonferroni Method

Comparison	χ^2	*p* value	Cramér's V
$0 to $25,000 vs. Over $65,000	7.35*	.025	.33
$0 to $25,000 vs. $26,000 to $65,000	.00	1.00	1.00
$26,000 to $65,000 to Over $65,000	7.35*	.025	.30

*p value $\leq .05$

Table 14

Analysis of Variance Among Anxiety Groups and DAS Scores

Source	*df*	*F*	η^2	*p*
Anxiety Group	2	5.86	.093	.004*
Error	111	(338.42)		

Note: Value enclosed in parentheses represent mean square errors.

Table 15

Means, Standard Deviations, and 95% Confidence Intervals of Pairwise Difference in Mean Changes in DAS Scores

Anxiety Group	*M*	*SD*	MA	AS
MA	123.01	13.11		
AS	110.75	23.94	1.21 to 23.45*	
AD	111.09	23.18	-7.65 to 31.63	-22.05 to 21.36

Note: An asterisk indicates that the 95% confidence interval does not contain zero, and therefore the difference in means is significant at the .05 significance level using Dunnett's C procedure.

Table 16

Means, Standard Deviations, and 95% Confidence Intervals of Pairwise Difference in Mean Changes in DAS Scores with Outlying Scores Omitted

Anxiety Group	*M*	*SD*	MA	AS
MA	123.08	13.11		
AS	113.86	16.14	.96 to 17.47*	
AD	111.09	23.18	-7.65 to 31.63	-17.62 to 23.17

Note: An asterisk indicates that the 95% confidence interval does not contain zero, and therefore the difference in means is significant at the .05 significance level using Dunnett's C procedure.

Table 17

Analysis of Variance of Anxiety Group and Number of Stressful Life Events

Source	*df*	*F*	η^2	*p*
Anxiety Group	2	1.53	.03	.22
Error	98	(31.93)		

*$p < .05$, one-tailed.
Note: Value enclosed in parentheses represents mean square error.

Table 18

Analysis of Variance among Anxiety Group and Number of Stressful Life Events with Outlying Scores Omitted (n = 98)

Source	*df*	*F*	η^2	*p*
Anxiety Group	2	4.79	.09	.01*
Error	95	(17.22)		

*$p < .01$, one-tailed.
Note: Value enclosed in parentheses represents mean square error.

Table 19

Means, Standard Deviations, and 95% Confidence Intervals of Pairwise Difference in Mean Changes in Number of Stressful Life Events with Outlying Scores Omitted

Anxiety Group	*M*	*SD*	MA	AS
MA	6.28	3.13		
AS	8.76	4.92	-4.62 to -.34*	
AD	9.20	5.32	-6.21 to .37	-3.84 to 2.95

Note: An asterisk indicates that the 95% confidence interval does not contain zero, and therefore the difference in means is significant at the .05 significance level using Dunnett's C procedure.

Table 20

Analysis of Variance among Anxiety Groups and Perception of Stressful Life Events

Source	*df*	*F*	η^2	*P*
Anxiety Group	2	3.48	.07	.035*
Error	92	(5631.59)		

*$p < .05$
Note: Value enclosed in parentheses represents mean square error.

Table 21

Means, Standard Deviations, and 95% Confidence Intervals of Pairwise Difference in Mean Changes in Perception of Stressful Life Events

Anxiety Group	*M*	*SD*	MA	AS
MA	245.97	10.51		
AS	287.33	13.06	-81.30 to -1.42*	
AD	239.83	22.63	-53.29 to 65.57	-14.74 to 109.75

Note: An asterisk indicates that the 95% confidence interval does not contain zero, and therefore the difference in means is significant at the .05 one-tailed significance level using Tukey procedure.

Table 22

Means, Standard Deviations, and 95% Confidence Intervals of Pairwise Difference in Mean Changes in Perception of Stressful Life Events with Outliers Omitted (n = 88)

Anxiety Group	*M*	*SD*	MA	AS
MA	262.10	51.27		
AS	302.00	51.61	-67.85 to -11.96*	
AD	256.01	43.51	-35.97 to 48.14	2.07 to 89.90*

Note: An asterisk indicates that the 95% confidence interval does not contain zero, and therefore the difference in means is significant at the .05 one-tailed significance level using Tukey procedure.

Table 23

Pearson Chi-Square Analyses of Anxiety and Pregnancy Intendedness

Variable	Group				
	MA *n (%)*	AS *n (%)*	AD *n (%)*	χ^2	*p* value
Pregnancy Intendedness				.40	.82
Intended	24 (42.9)	15 (34.9)	4 (9.3)	-	-
Unintended	32 (50.8)	34 (36.5)	8 (12.7)	-	-
Consider Termination				5.81	.055
Did consider	1 (12.5)	5 (62.5)	2 (25.0)	-	-
Did not consider	55 (56.1)	33 (33.7)	10 (10.2)	-	-
Variable	Combined Group				
	MA *n (%)*	ASD *n (%)*		χ^2	*p* value
Consider Termination				5.43	.019*
Did consider	1 (10.0)	9 (90.0)		-	-
Did not consider	55 (48.2)	59 (51.8)		-	-

*$p < .05$

Table 24

Mean, Standard Deviations and Ranges of STAI (State-Anxiety) Scores across Weekly Hospitalization

Variable		All Subjects	
STAI (S-Anxiety scale)	*n*	*M (SD)*	*Range*
Week 1 (post-admission)	42	33.71 (12.85)	20 to 71
Week 2	27	31.00 (11.07)	20 to 57
Week 3	17	35.21 (13.30)	20 to 58
Week 4	12	32.83 (11.60)	20 to 60
Week 5	8	29.13 (8.03)	21 to 44
Week 6	6	30.50 (11.59)	20 to 46
Week 7	5	34.60 (10.92)	20 to 46
Week 8	2	25.50 (7.78)	20 to 31
Week 9	2	27.00 (9.90)	20 to 34
Week 10	2	27.50 (6.36)	23 to 32
Week 11	2	30.00 (9.90)	23 to 37
Week 12	1	26.00 (-)	-

Table 25

Length of Hospitalization in Weeks from Initial Admission to Week Twelve

Length in Weeks	MA *n* (%)	AS *n* (%)	AD *n* (%)
0 (Admission)	57 (44.9)	58 (45.7)	12 (9.4)
1	22 (52.4)	14 (33.3)	6 (14.3)
2	14 (51.9)	8 (29.6)	5 (18.5)
3	10 (58.8)	3 (17.6)	4 (23.5)
4	7 (58.3)	3 (25.0)	2 (16.7)
5	5 (62.5)	3 (37.5)	-
6	3 (50.0)	3 (50.0)	-
7	2 (40.0)	3 (60.0)	-
8	1 (50.0)	1 (50.0)	-
9	1 (50.0)	1 (50.0)	-
10	1 (50.0)	1 (50.0)	-
11	1 (50.0)	1 (50.0)	-
12	1 (100.0)	-	-

Table 26
Mean STAI (State-Anxiety) Scores across Weekly Hospitalization with Last Score Continued One Week

Variable	All Subjects		
STAI (State-Anxiety)	MA *M (SD)*	AS *M (SD)*	AD *M (SD)*
Week 1	27.70 (9.92)	40.00 (2.83)	48.25 (16.24)
Week 2	26.90 (10.07)	34.50 (2.12)	48.00 (6.38)
Week 3	28.70 (10.00)	42.42 (7.89)	51.20 (6.95)
Week 4	29.20 (11.82)	32.50 (3.54)	48.25 (6.95)

Table 27

Pearson Product-Moment Correlations among STAI (State-Anxiety), CES-D, and EPDS scales at Initial Admission

	STAI	CES-D	EPDS
STAI (State-Anxiety)	-	.66*	.60*
CES-D	.66*	-	.76*

*$p < .008$ for bivariate correlations
Note: STAI ($n = 100$)
CES-D ($n = 87$)
EPDS ($n = 100$)

Table 28

Mean STAI (State-Anxiety scale), EPDS, and CES-D Scores across Five Weeks of Hospitalization

Variable	All Subjects					
	STAI		CES-D		EPDS	
	n	*M* (*SD*)	*n*	*M* (*SD*)	*n*	*M* (*SD*)
Week 0 (admission)	128	40.47 (11.84)	111	15.96 (10.10)	129	9.48 (5.83)
Week 1	42	33.71 (12.85)	55	13.51 (11.01)	54	7.30 (5.98)
Week 2	27	31.00 (11.08)	35	10.49 (6.7)	34	5.79 (4.90)
Week 3	17	35.21 (13.30)	24	10.63 (9.17)	23	5.65 (4.84)
Week 4	12	32.83 (11.60)	17	12.00 (10.47)	16	5.06 (5.16)

Table 29

Pearson Product-Moment Correlations for STAI (S-Anxiety), CES-D, and EPDS scores Across Five Weeks of Hospitalization

Week	Week 1		Week 2		Week 3		Week 4	
STAI (S-Anxiety scale)	CESD	EPDS	CESD	EPDS	CESD	EPDS	CESD	EPDS
Week 1	.92**	.87**	.73**	.66**	.73**	.72**	.41	.41
Week 2	.67**	.77**	.73**	.83**	.91**	.90**	.79**	.80**
Week 3	.70**	.78**	.87**	.86**	.89**	.88**	.62*	.65*
Week 4	.70**	.77**	.62*	.70**	.60*	.66**	.68**	.63*

** $p \leq .01$ (one-tailed). * $p \leq .05$ (one-tailed)

Table 30

Binary Logistic Regressions Predicting Anxiety ASD Group Membership with CES-D, and EPDS at First Week of Hospitalization

Predictor	β	Standard Error	Wald's	*df*	*p*	Odds Ratio	95% Confidence Interval	
							Upper	Lower
Step 1								
EPDS	.31	.09	12.05	1	.001**	1.36	1.14	1.62
Step 2								
CES-D	.29	.14	4.27	1	.039*	1.34	1.02	1.77
EPDS	.01	.15	.004	1	.952	1.01	.75	1.36
Step 3								
CES-D	.30	.90	10.07	1	.002*	1.35	1.12	2.63

**$p \leq .001$. * $p \leq .05$.

Note: Variable entered on Step 1: EPDS score
Variable entered on Step 2: CES-D score

Table 31

Binary Logistic Regressions Predicting Anxiety ASD Group Membership with CES-D, and EPDS at Second Week of Hospitalization

Predictor	β	Standard Error	Wald's	*df*	*p*	Odds Ratio	95% Confidence Interval	
							Upper	Lower
Step 1								
CES-D	.27	.08	10.16	1	.001**	1.30	1.11	1.54

**$p \leq .001$. * $p \leq .05$

Note: Variable entered on Step 1: CES-D score
Variable not entered: EPDS score

Table 32

Binary Logistic Regressions Predicting Anxiety ASD Group Membership with CES-D, and EPDS at Third Week of Hospitalization

Predictor	β	Standard Error	Wald's	*df*	*p*	Odds Ratio	95% Confidence Interval	
							Upper	Lower
Step 1								
CES-D	.17	.08	4.49	1	.034*	1.19	1.01	1.40

**$p \leq .001$. *$p \leq .05$

Note: Variable entered on Step 1: CES-D score
Variable not entered: EPDS score

Table 33

Analysis of Variance among Type of Obstetric Complication and Anxiety

Complication Type	*n*	*M*	*SD*	
Maternal Only	116	40.14	11.79	
Fetal only	2	50.50	4.95	
Both maternal and fetal	6	34.57	9.23	
Source	*df*	*F*	η^2	*p*
Complication Type	2	1.47	.02	.23
Error	121	(135.78)		

Note: Value enclosed in parentheses represents mean square error.

Table 34

Descriptive Statistics and Significance Levels for Delivery Outcomes and Anxiety

Variable	Group				
	MA	AS	AD	Statistic	*p* value
	n (%)	*n (%)*	*n (%)*		
Cesarean delivery				$\chi^2(2, n = 77) = .88$	.65
Cesarean	26 (59.1)	11 (25.0)	7 (15.9)	-	-
Vaginal	20 (60.3)	10 (30.3)	3 (9.1)	-	-
Fetal respiratory distress	16 (64.0)	12 (24.0)	3 (12.0)	$\chi^2(2, n = 60) = 2.12$	.38
NICU transport				$\chi^2(2, n = 58) = .15$	.93
Yes	24 (63.2)	11 (28.9)	3 (7.9)	-	-
No	13 (65.0)	5 (25.0)	2 (10.0)	-	-
	M (SD)	*M (SD)*	*M (SD)*		
Maternal delivery complications	.08 (.27)	.17 (.38)	.17 (.41)	$F(2, 60) = .59$	.56
Apgar scores				-	-
1-minute	6.88 (2.04)	6.90 (1.97)	7.33 (1.37)	$F(2, 58) = .08$	.93
5-minutes	8.33 (1.66)	8.00 (2.42)	8.83 (.41)	$F(2, 59) = .48$	.62

Table 35

Descriptive Statistics and Significance Levels for Delivery Outcomes and Group Membership

Variable	Groups			
	MA *n (%)*	ASD *n (%)*	Statistic	*p* value
Cesarean delivery			$\chi^2(1, n = 98) = .001$	.97
Cesarean section	29 (50.9)	28 (49.1)	-	-
Vaginal delivery	21 (51.2)	20 (48.8)	-	-
Fetal respiratory impairment	19 (53.5)	15 (44.1)	$\chi^2(1, n = 77) = .04$	.83
Transport to NICU			$\chi^2(1, n = 73) = .02$	.90
Yes	26 (55.3)	21 (41.7)	-	-
No (with mother)	14 (53.8)	12 (46.2)	-	-
	M (SD)	*M (SD)*		
Maternal delivery complications	.07 (.26)	.13 (.34)	$t(77) = .85$	.40
Apgar scores			-	-
1-minute	6.88 (2.04)	6.97 (1.87)	$t(76) = -.21$	.84
5-minutes	8.29 (1.63)	7.97 (2.26)	$t(77) = .42$	.67

Table 36

Binary Logistic Regression Predicting Anxiety Group Membership with Demographic Variables and Psychosocial Measures

Predictor	β	Standard Error	Wald's	*df*	*p*	Odds Ratio	95% Confidence Interval	
							Upper	Lower
Step 1								
EPDS	.44	.09	22.43	1	.000**	1.56	1.30	1.87
Step 2								
CES-D	.24	.09	7.22	1	.007*	1.27	1.07	1.52
EPDS	.28	.10	7.28	1	.007*	1.32	1.08	1.62

**$p \leq .001$. *$p \leq .05$

Note: Variable entered on Step 1: EPDS score
Variable entered on Step 2: CES-D score

FIGURES

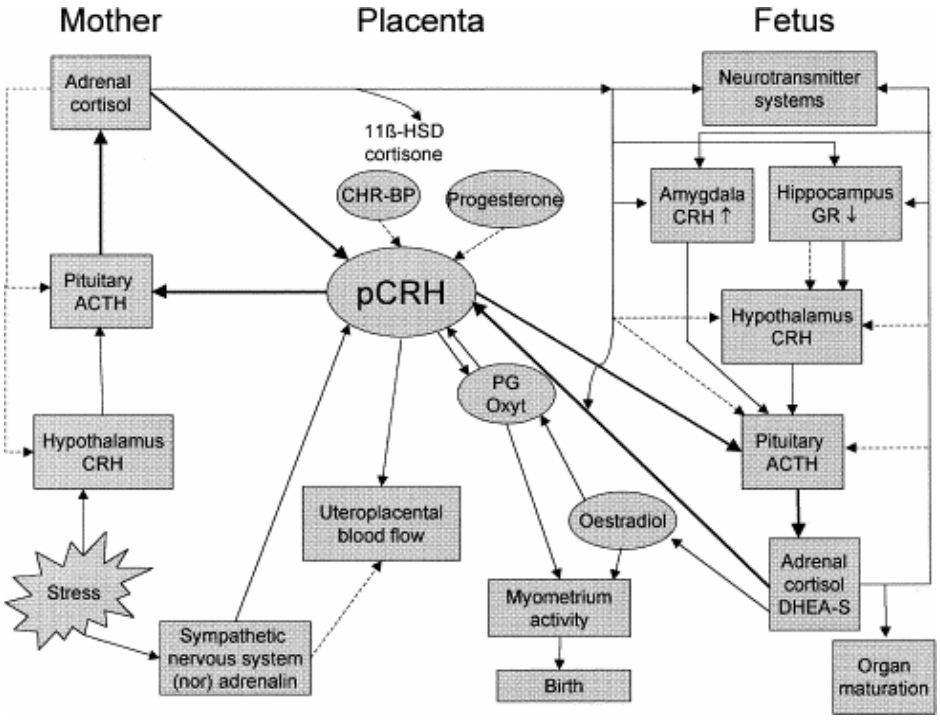

Figure 1. Effects of maternal stress on uteroplacental blood flow and hormonal regulation in the mother, placenta, and fetus, and on fetal development and the duration of pregnancy. Activating influences are indicated by solid lines; inhibitory effects, including negative feed-back, by dotted lines. The presence of feed-forward mechanisms at either side of the placenta is represented by thick lines.

Note. From "Prenatal maternal stress: Effects on pregnancy and the (unborn) child," by Mulder et al., 2002, *Early Human Development, 70 (1-2),* p. 9. Copyright 2002 by Elsevier. Reprinted with permission from the publisher.

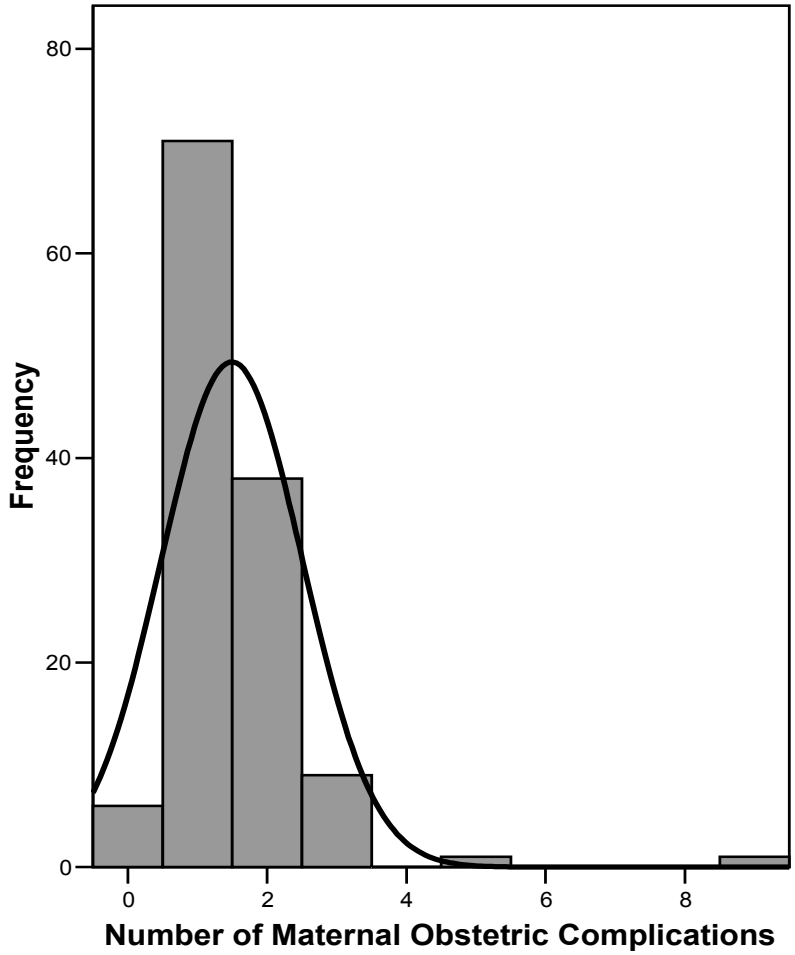

Figure 2. Frequency of maternal obstetric complications in the sample.

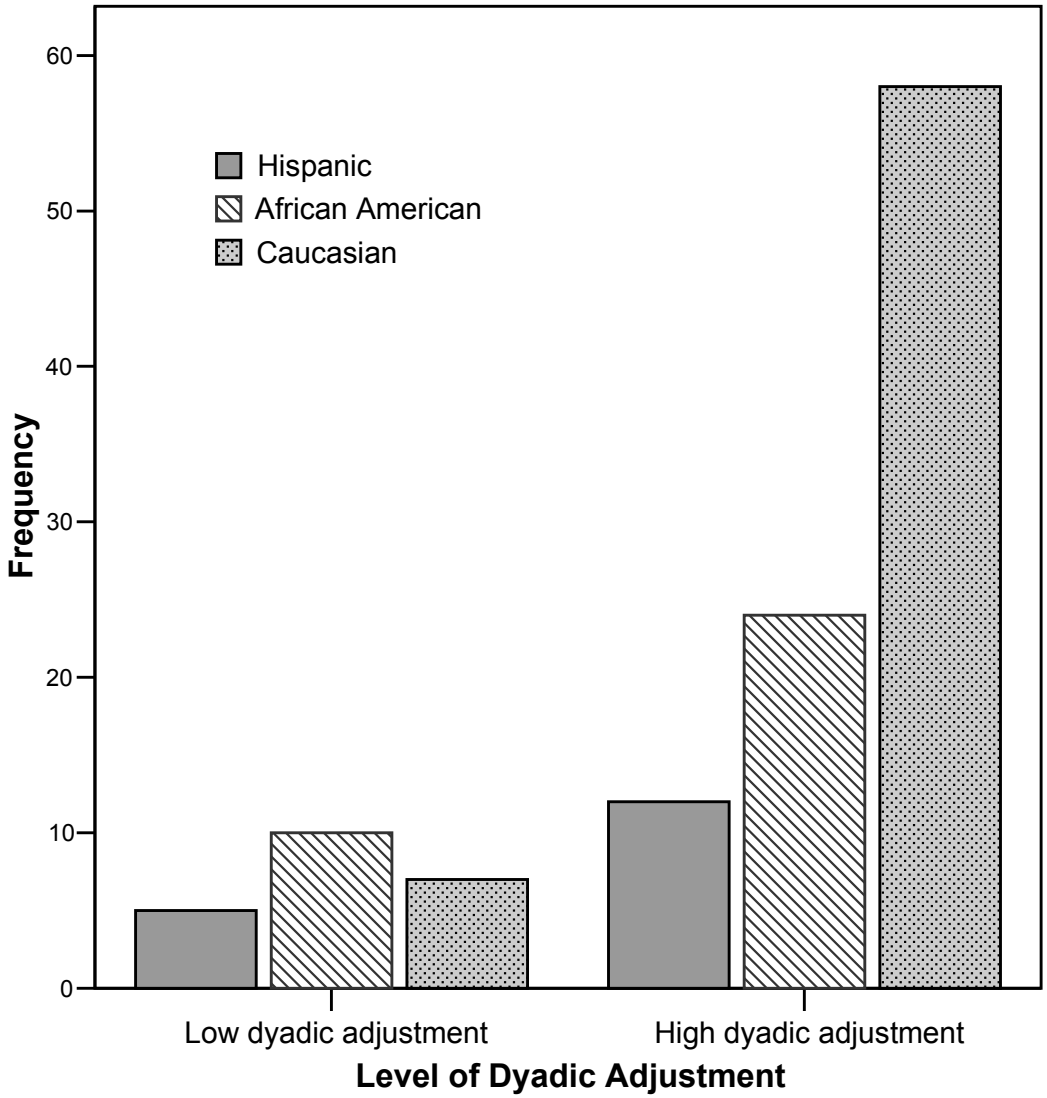

Figure 3. Differences in level of dyadic adjustment by ethnic group.

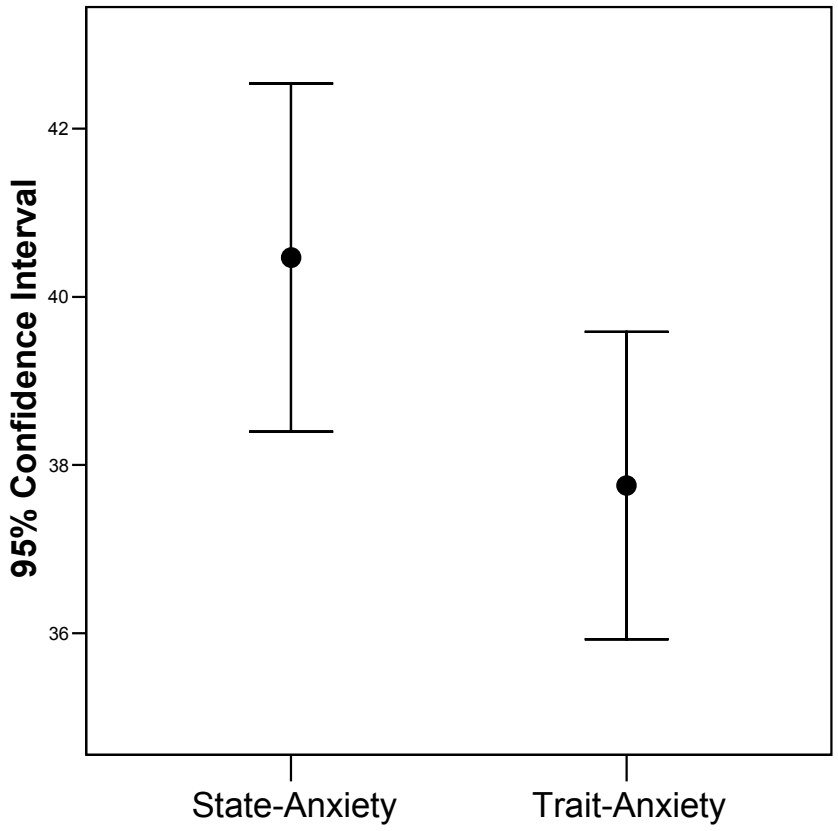

Figure 4. Mean and 95% Confidence Intervals for the State-Anxiety and Trait-Anxiety scores in the sample.

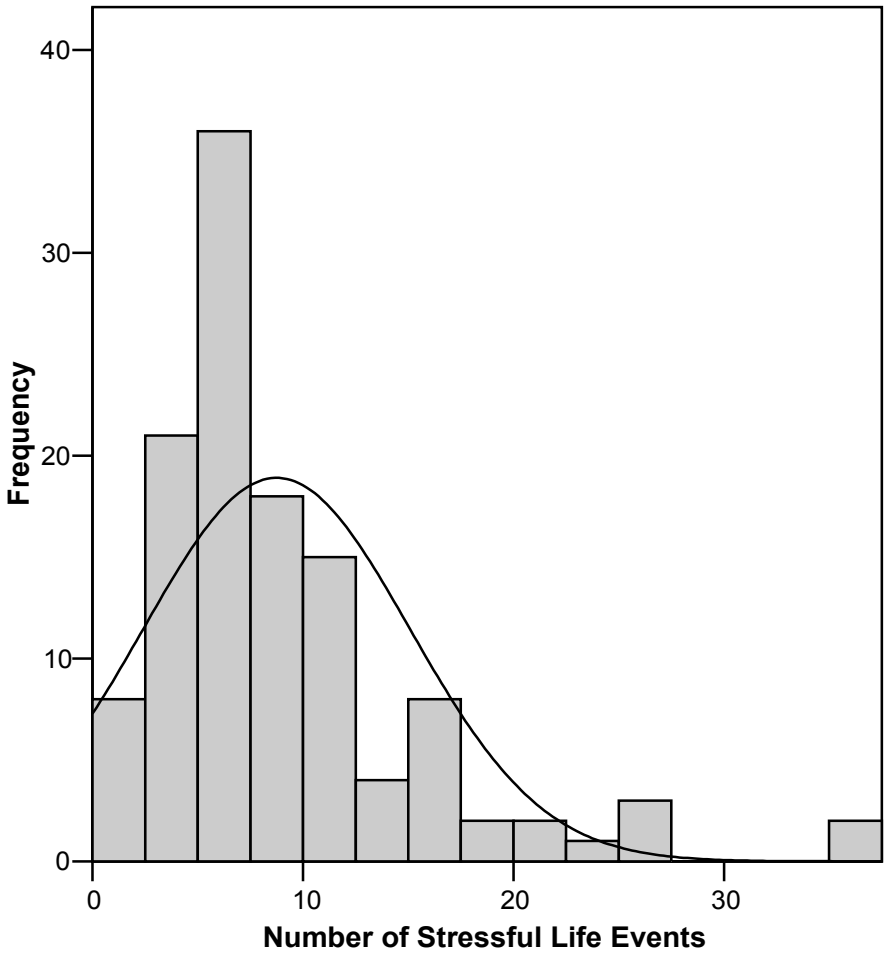

Figure 5. Frequency of number of stressful life events in the sample.

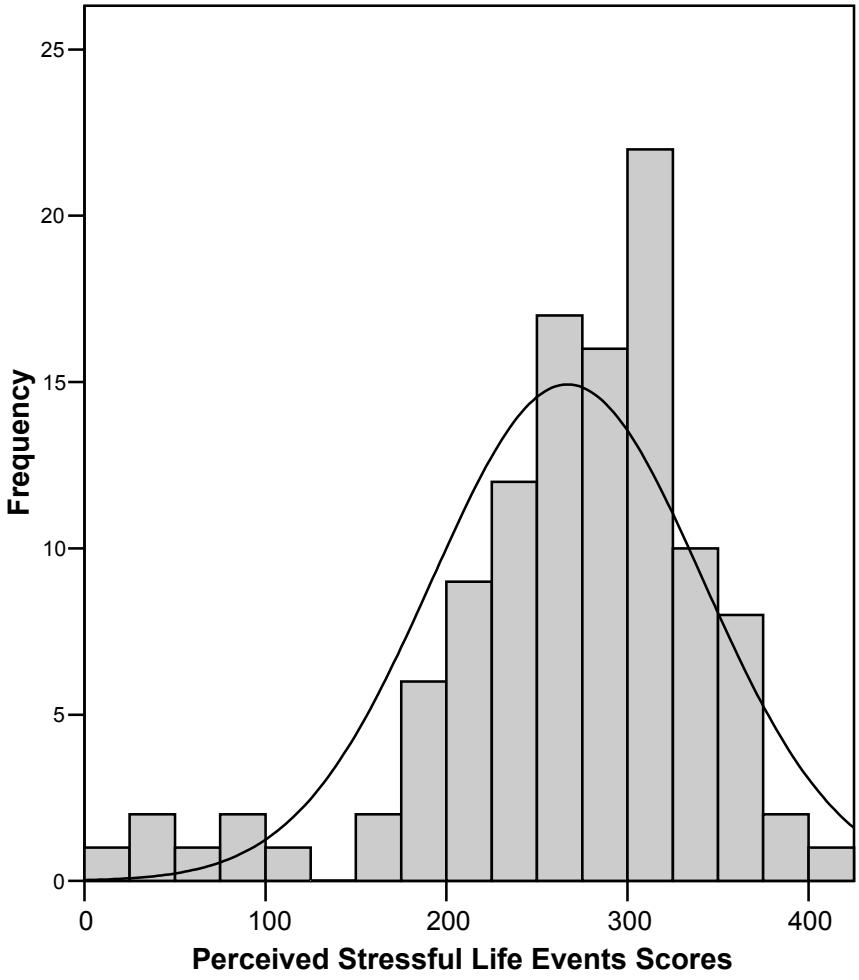

Figure 6. Distribution of participants' scores of perceived distress of stressful life events.

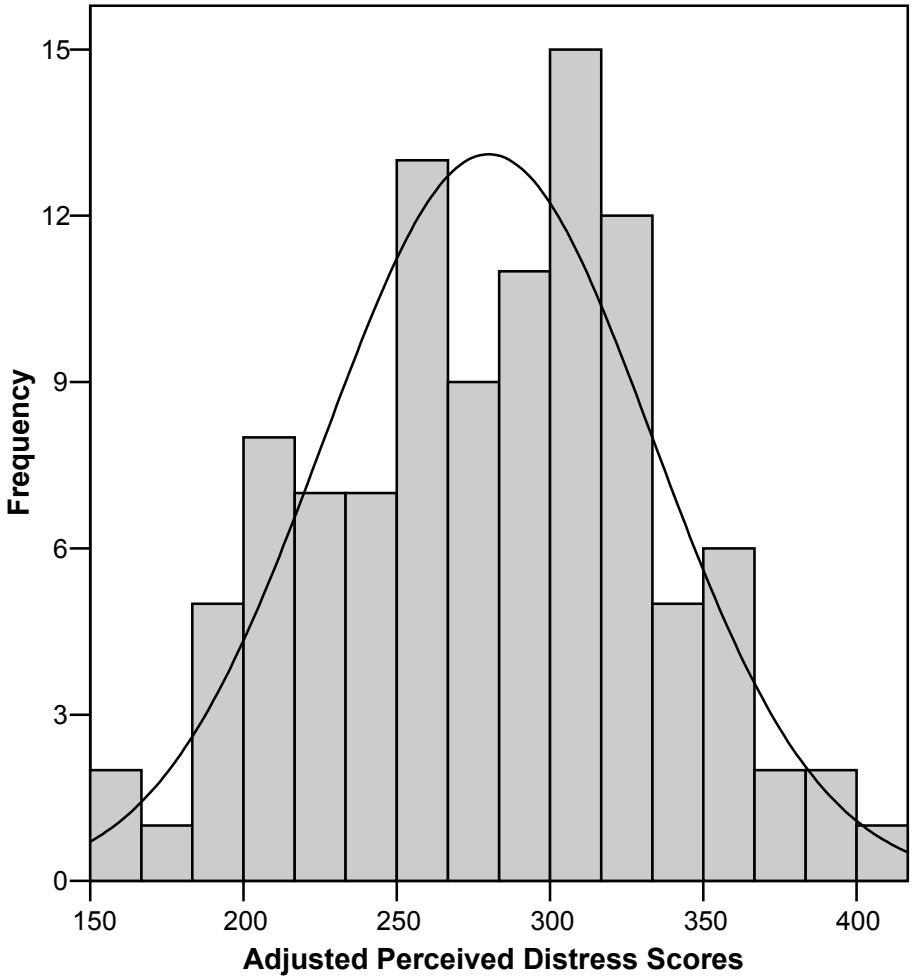

Figure 7. LESFOG perceived distress scores adjusted after omission of extreme outlying scores.

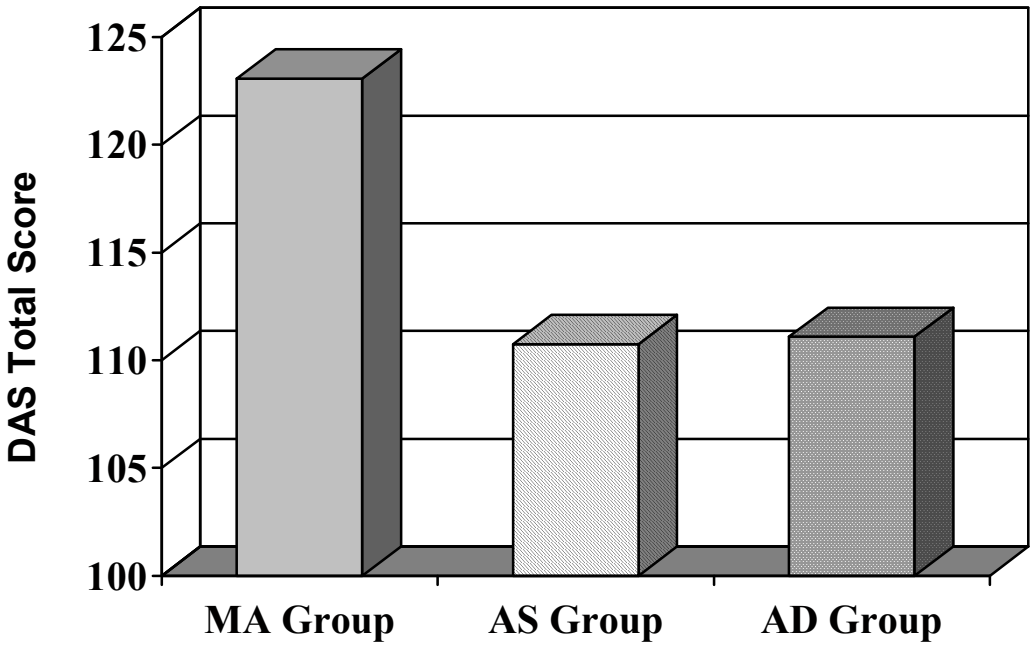

Figure 8. Anxiety group differences in total DAS scores.

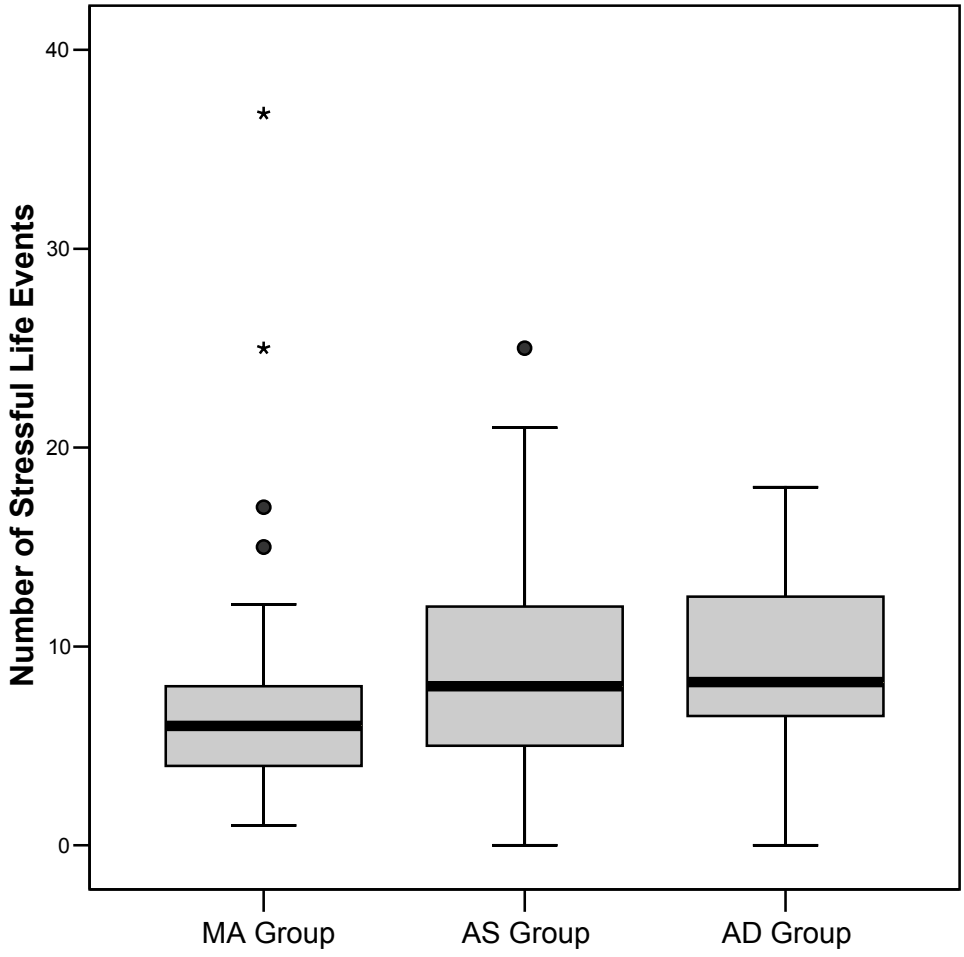

Figure 9. Distribution of LESFOG (number of SLEs) by Anxiety group membership. Asterisk represents extreme outlying score.

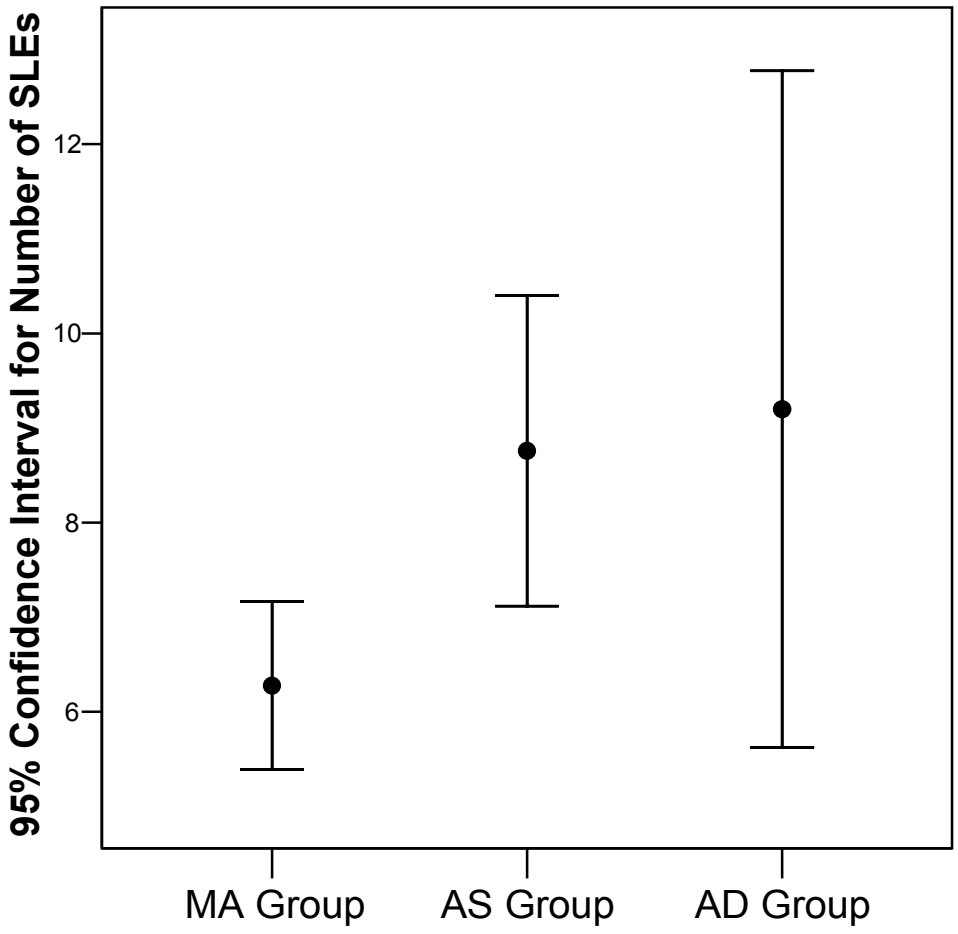

Figure 10. Distribution of LESFOG (number of SLEs) by Anxiety group membership, controlling for outlying scores.

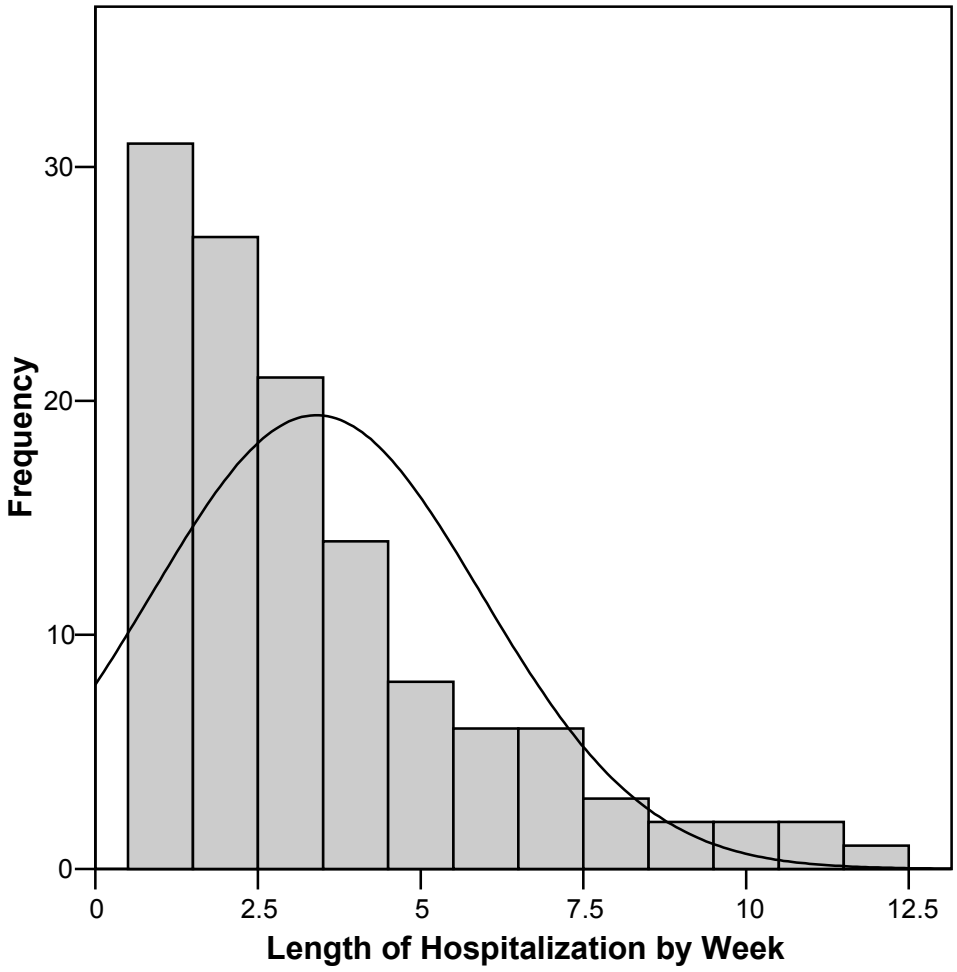

Figure 11. Distribution of participants hospitalized each week post-admission.

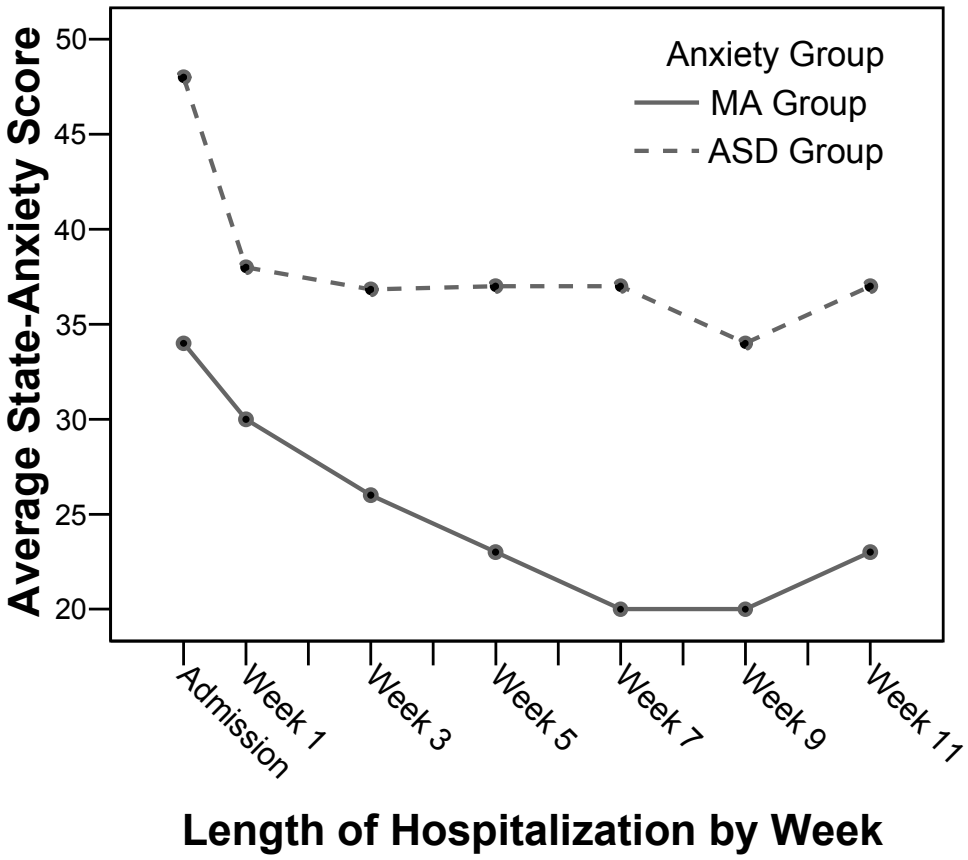

Figure 12. Comparison of MA and ASD average State-Anxiety scores for each of hospitalization including admission.

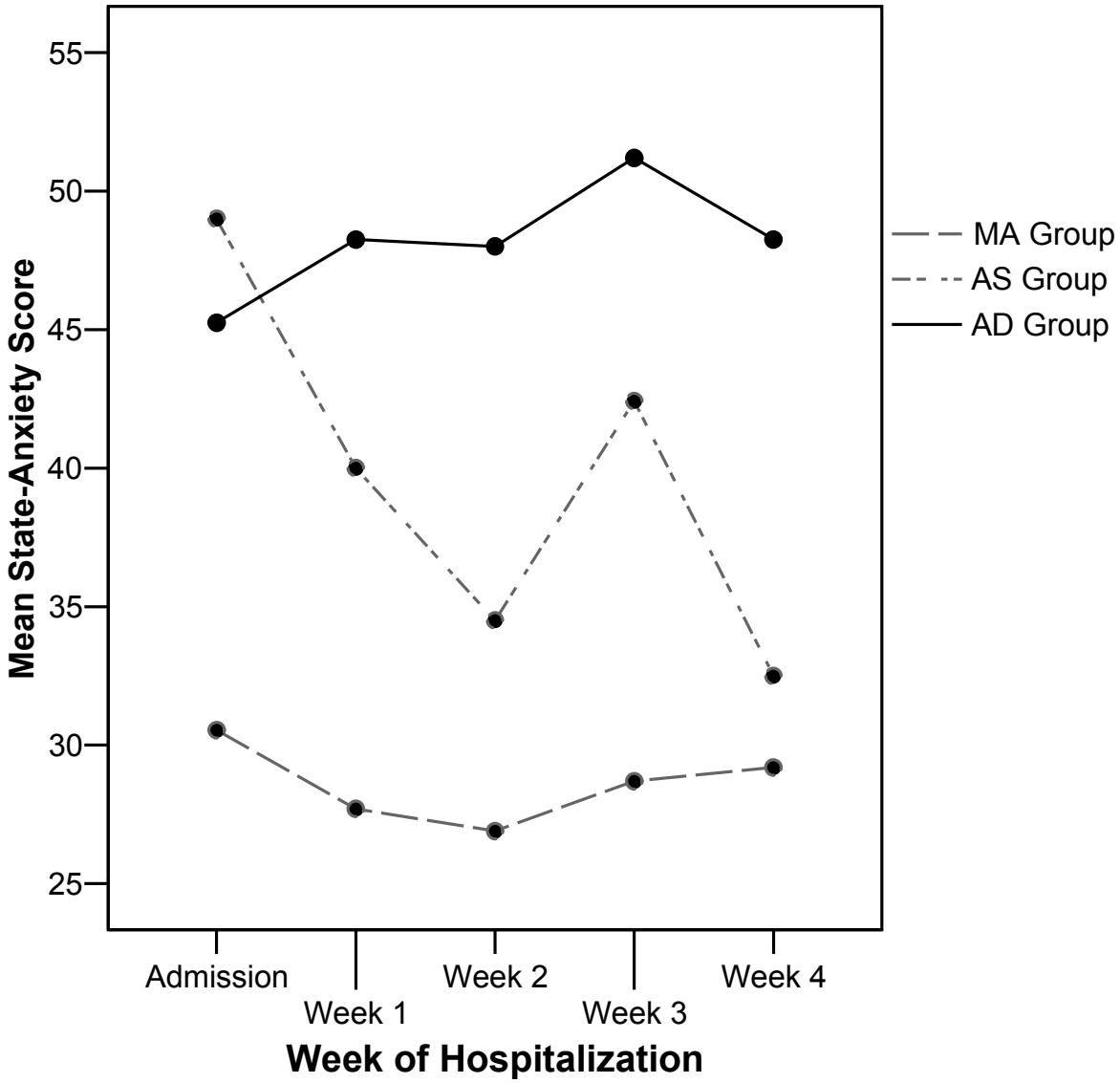

Figure 13. Distribution of State-Anxiety scores for the three Anxiety groups across four weeks of hospitalization following initial admission.

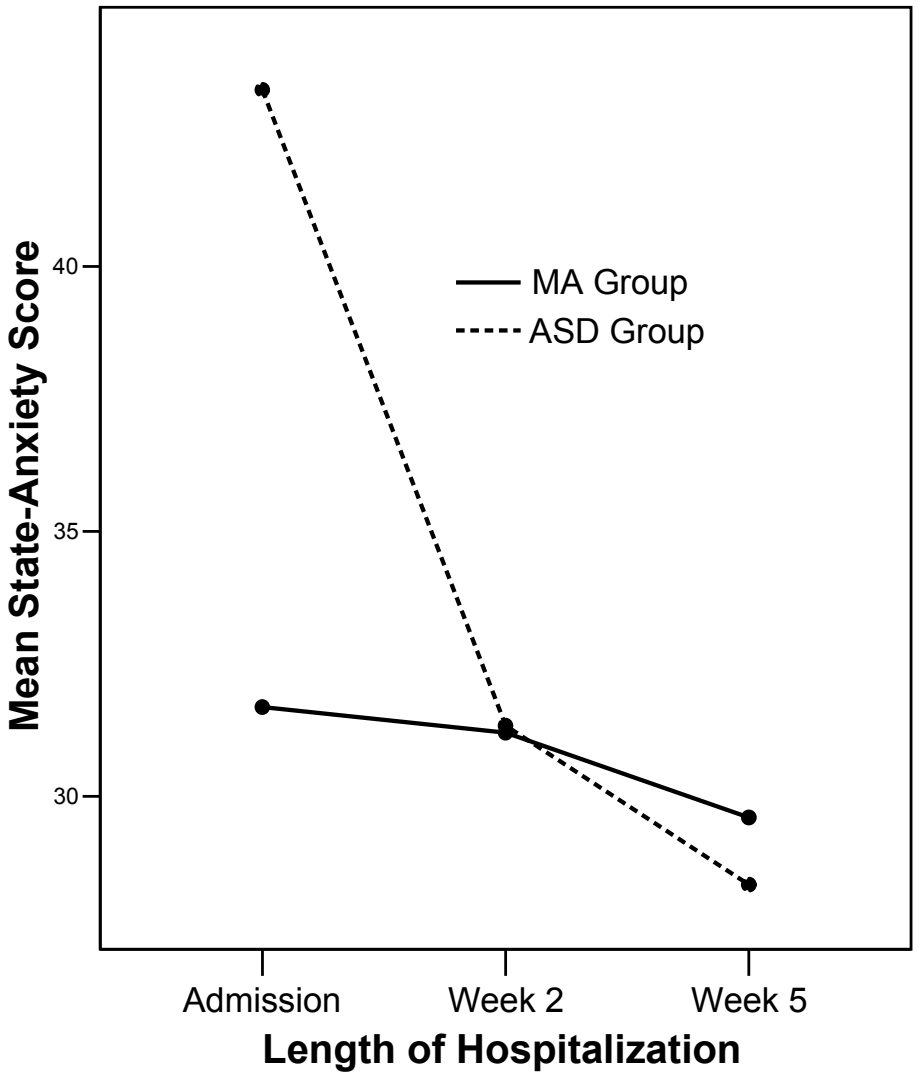

Figure 14. Estimated average scores of the State-Anxiety scale for the MA and ASD Groups at admission, week 2, and week 5 of hospitalization.

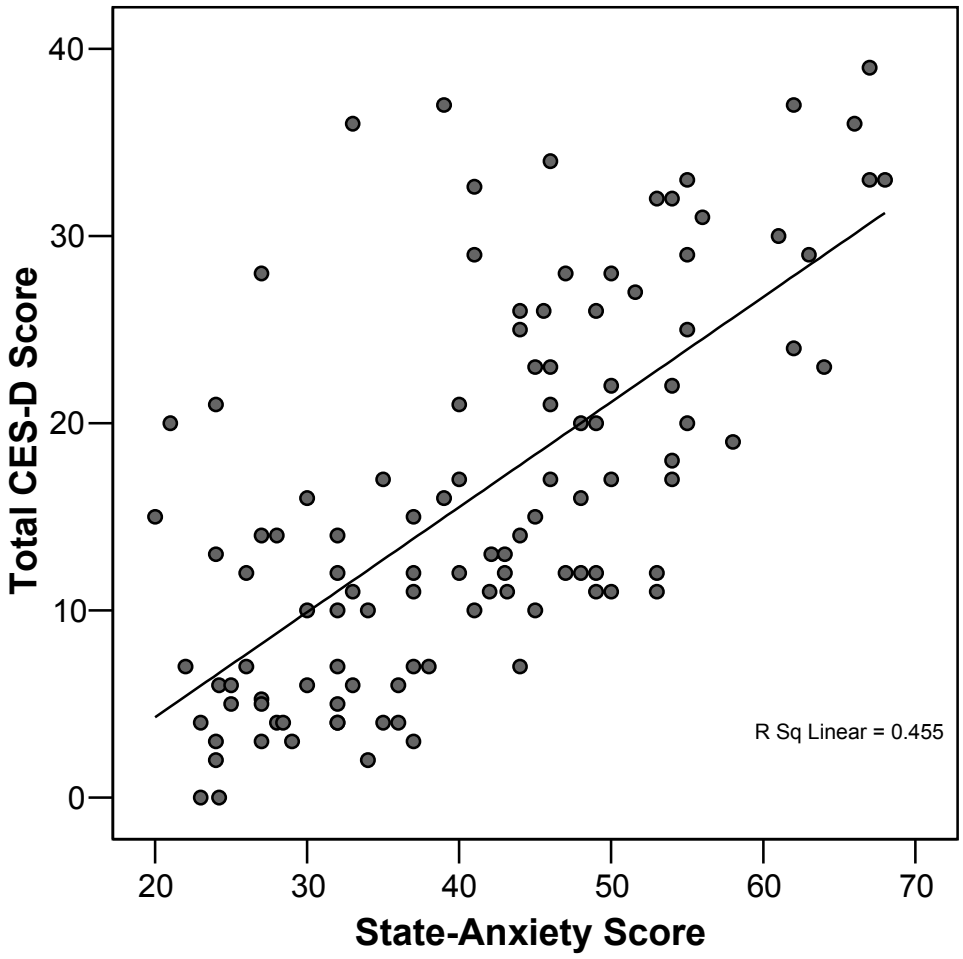

Figure 15. Bivariate scatterplot demonstrating the correlation between scores on the State-Anxiety and CES-D at admission.

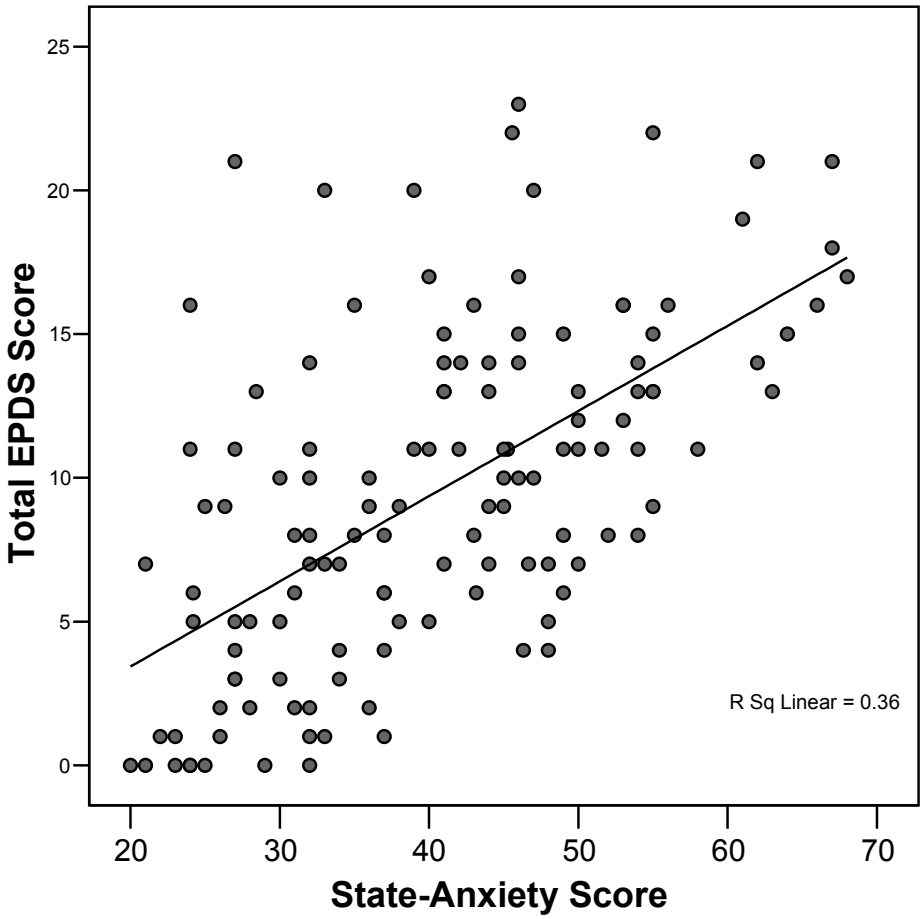

Figure 16. Bivariate scatterplot demonstrating the correlation between scores on the State-Anxiety and EPDS at admission.

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VITAE

Dana Broussard Labat was born in New Orleans, Louisiana to Jinx Broussard, Ph.D. and Robert Broussard, Sr. She graduated from Eleanor McMain Magnet Secondary School in 1995. She attended Fisk University in Nashville, Tennessee. During that time, she was inducted into Phi Beta Kappa and Psi Chi National Honor Societies. She earned a Bachelor of Arts degree in psychology from Fisk University in 1999. She subsequently earned a Master of Arts degree in Media Studies from The Pennsylvania State University in State College, Pennsylvania in 2001. Dana was then employed as a marketing associate with the National Basketball Association in New York, New York. In August 2003, she entered the Clinical Psychology Doctoral Program in the Graduate School of Biomedical Sciences at the University of Texas Southwestern Medical Center at Dallas. She was awarded the Doctor of Philosophy in Clinical Psychology in August of 2007. Following graduation, she will begin a Postdoctoral Fellowship with Children's Medical Center Dallas' in-patient psychiatry services.