PRENATAL ATTACHMENT DURING ANTEPARTUM HOSPITALIZATION:

ASSOCIATIONS WITH PREGNANCY PLANNING, PARTNER

RELATIONSHIP, AND POSTPARTUM DEPRESSION

AND ANXIETY

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by

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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 would like to express my gratitude to the members of my dissertation committee. Dr. Monty Evans, the chair of my committee, helped me achieve a greater understanding of psychodynamic theory in general and of attachment theory in particular, which led to my interest in this project. Dr. Richard Robinson provided guidance throughout the study and was especially helpful in sharing his knowledge of experimental design and statistical analyses. I am grateful to Dr. Sandra Pitts, who challenged me to think critically about this research at every stage. Drs. Wayne Denton and Allen Stringer, as members of my committee, provided their time and suggestions. My colleagues and friends, Dana Labat and Paula Miltenberger, also contributed a great deal to this project, and Anna Brandon's efforts were instrumental.

I am truly grateful to the teachers and supervisors who have contributed to my growth as a psychologist. In particular, Drs. Lara Hastings and Rycke Marshall were superior supervisors. Both demonstrated tremendous compassion and offered their wisdom and support as I grappled with the challenges of clinical training. Dr. Michael Terman introduced me to clinical research. He was a true mentor and an advocate for my continued education. Dr. Melissa Black helped with both my personal and professional development and has inspired me in

countless ways. I will always remember these talented, caring individuals and will strive to share their lessons with others.

My family and friends have been very supportive throughout my graduate education and were especially patient and understanding during this project. I want to thank my parents for their conviction in my abilities, especially when my own confidence wavered. Of my graduate school "family," I am most grateful to my classmates Albert Banta, Dana Labat, and Ann Eggertsen for their insight, support, and friendship during our journey. Albert was the best study partner one could ask for and made daunting workloads seem manageable. Our conversations as we began our clinical work enriched my understanding and appreciation of the work we chose to do. Dana was an invaluable friend and colleague during this project and throughout graduate school. She helped put things in perspective, provided me with balance, and could always make me laugh when I needed to. Ann helped me through an extremely challenging time. Her presence and friendship provided me with solace and reassurance when I needed it most. Nadezhda Gaubert, Lauren Dennhardt, and Darci Mills, my voices from "the outside," provided consistent encouragement and helped me to stay grounded.

Finally, I would like to thank the staff at Baylor University Medical Center, as well as all of the women (and babies) who participated in the study. I sincerely appreciate their time, interest, and cooperation, which were essential for the completion of this project.

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Little is known about factors that may interfere with a woman's ability to attach to her fetus in the context of antepartum hospitalization. This study investigated the effects of pregnancy planning, considering termination, and the quality of a romantic relationship on maternal-fetal attachment in a group of women hospitalized for obstetric complications. One hundred twenty-nine women

completed the Maternal Antenatal Attachment Scale during antepartum hospitalization. Participants also completed the Dyadic Adjustment Scale and reported whether their pregnancy was planned and whether they had considered terminating their current pregnancy. No differences in reported levels of prenatal attachment were found between women with planned and unplanned pregnancies or between those who had considered termination and those who had not. There was a positive correlation between reported satisfaction in a primary romantic relationship and prenatal attachment. Although small associations were detected between prenatal attachment and postpartum depression, this finding did not reach statistical significance. No relationship between antenatal attachment and postpartum anxiety was identified. The findings suggest that the quality of a woman's relationship with her partner influences the level of attachment to her fetus.

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PRIOR PUBLICATIONS

Terman, M., Macchi, M. M., Goel, N., Rifkin, J. B., Terman J. S., & Williams, J. B. W.
(2003). Diagnostic reliability and symptom pattern of DSM-IV atypical features
in seasonal and nonseasonal depression. *Chronobiology International, 20*:1157-
1159.

Rifkin, J. B., Terman, M., Williams, J. B. W., Stewart, J. W., Goel, N., & Terman, J. S.
(1999, May). *Assessment of Atypical Depression in Seasonal Affective Disorder.*
Poster session presented at the annual meeting of the Society for Light Treatment
and Biological Rhythms, Alexandria, VA.

Terman, M., Rifkin, J. B., Stewart, J. W., & Williams, J. B. W. (1998). *The Diagnostic
Interview for Atypical Depression (DIAD).* New York: New York State
Psychiatric Institute. Unpublished instrument.

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LIST OF DEFINITIONS

Antenatal – Before birth.

Antepartum – The time between conception and labor; the period of pregnancy.

Cognitive Map – A mental representation of one's environment.

Ethology – The study of animal behavior under natural conditions.

Gravida – A pregnant woman; often used to refer to number of pregnancies.

Major Depressive Disorder – According to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* (DSM-IV-TR; APA, 2000), it is a mood disorder "characterized by one or more Major Depressive Episodes (i.e., at least 2 weeks of depressed mood or loss of interest accompanied by at least four additional symptoms of depression)" (p. 345). The other symptoms include change in appetite, disturbed sleeping patterns, being physically slowed down or agitated, feeling fatigued, feeling worthless or guilty, having trouble concentrating, and having suicidal thoughts.

Minor Depressive Disorder - According to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* (DSM-IV-TR; APA, 2000), it is a mood disorder that does not meet the criteria for Major

Depressive Disorder in that there are "fewer symptoms and less

impairment" (p. 775).

Parity – The number of births a woman has had.

Prenatal – Before birth.

Prevalence – The percentage of a population with a condition over a specified

period.

Point Prevalence – The percentage of a population with a condition at a specific

time.

Postnatal – Following birth, referring to the infant.

Postpartum – After birth.

CHAPTER ONE

Introduction

Background and Rationale

Each year, approximately 700,000 women in the United States are

hospitalized due to complications related to pregnancy (Maloni, Kane, Suen, &

Wang, 2002). The most common causes of antepartum hospitalization are preterm

labor, nausea and/or vomiting, genitourinary complications, hypertension,

hemorrhage, diabetes, bacterial or parasitic infections, mental disorders, cervical

incompetence, preterm premature rupture of membranes, and asthma (Bacak,

Callaghan, Dietz, & Crouse, 2005). Hospitalization provides a constant reminder

to the mother that she and/or her fetus are in danger. Although many women

focus on maternal tasks during pregnancy in preparation for the baby, those

confined to a hospital for antepartum care often question whether they will even

be a mother (Barcley & Ziehm, 1977). This threat to her own well-being and to

the viability of the child can create considerable ambivalence in the pregnant

mother. Consequently, she may fail to develop or may withhold her love for the

fetus, and her psychological adaptation toward motherhood may be hindered,

leaving her feeling incompetent in the maternal role once the baby is born

(Penticuff, 1982). Such feelings of helplessness may ultimately result in depressed

mood.

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The maternal-fetal bond has received increasing attention over the past few decades as an extension of attachment theory. A woman's ability to bond with her fetus has implications for her capacity to be an effective, responsive parent. Several researchers have made connections between prenatal attachment and postnatal maternal behaviors (Bloom, 1995; Muller, 1996; Siddiqui & Hagglof, 2000). Numerous studies, almost exclusively of non-hospitalized women, have also looked at how maternal-fetal attachment is associated with other factors, such as age, ethnicity, parity, anxiety, depression, relationship with partner, social support, pregnancy acceptance, and risk status (cf. Cannella, 2005). In contrast, prenatal attachment has only been reported in three studies of high-risk, hospitalized women (Curry, 1987; Mercer, Ferketich, May, DeJoseph, & Sollid, 1988; Mercer & Ferketich, 1994); both studies co-authored by Mercer drew from the same sample of women.

Curry (1987) found that women hospitalized for pregnancy-related complications scored significantly lower on a measure of pregnancy acceptance compared with a sample of women with uncomplicated pregnancies. She noted that the measure of pregnancy acceptance used may have reflected the woman's feelings about the complications rather than the pregnancy itself (Curry, 1987). Other studies linking readiness for or planning of pregnancy to maternal-fetal attachment have yielded mixed results (Condon & Corkindale, 1997; Mercer et al., 1988). Given that nearly half of all pregnancies in the United States are

unplanned (Finer & Henshaw, 2006), this variable deserves further attention. The current study will examine whether pregnancy planning impacts maternal-fetal attachment in a hospitalized population.

Although women with unplanned pregnancies may experience greater ambivalence toward their fetus than women who planned to conceive, women who considered an elective termination of their pregnancies might feel even greater uncertainty, particularly when faced with hospitalization. To date, no study has looked at how contemplating abortion at some point during the pregnancy affects prenatal attachment. In 2001, 1.3 million elective abortions were performed; however, this accounted for less than one-half of the unplanned pregnancies reported (Finer & Henshaw, 2006). Given the gravity of hospitalization due to pregnancy and a woman's apparent ambivalence about a pregnancy she considered terminating, this also warrants investigation. This study will look at whether contemplating an elective abortion of the current pregnancy has an impact on a woman's bond with her fetus during antepartum hospitalization.

One variable that has received considerable attention in terms of its effect on antenatal attachment is a woman's relationship with her primary romantic partner, typically the father of the child she is bearing. Studies have demonstrated that the quality of this mate relationship has a great impact on the woman's acceptance of her pregnancy (Porter & Demeuth, 1979; Richardson, 1983;

Snowden, Schott, Awalt, & Gillis-Knox, 1988; Zachariah, 2004). Only one study

to date has looked at the association between the reported quality of a woman's

relationship with her mate and prenatal attachment during antepartum

hospitalization (Mercer, Ferketich, May, DeJoseph, & Sollid, 1988). The finding

that this association was significant in low-risk, non-hospitalized women, but not

in high-risk, hospitalized women is curious. Mercer and colleagues (1988)

speculated that the hospitalized woman who faces the possibility of losing her

baby may become so emotionally invested in the fetus that other factors do not

affect this bond. They did not, however, compare the hospitalized women to one

another. The significance of the quality of a woman's relationship with her

partner in her acceptance of her pregnancy and, consequently, her level of

attachment to her fetus, particularly when faced with hospitalization, cannot be

ignored. This study will look at whether a woman's reported satisfaction in her

primary mate relationship is related to her level of prenatal attachment in a sample

of hospitalized women.

In addition to the factors mentioned above, this study will also examine

whether prenatal attachment has any value in predicting postpartum depression

and anxiety. Postpartum depression affects nearly 15% of women during the first

three months after delivery (Gaynes et al., 2005), while anxiety is prominent in

approximately 8% of women at eight weeks postpartum (Heron, O'Connor,

Evans, Golding, & Glover, 2004; Amy Wenzel, Haugen, Jackson, & Brendle,

2005). Depression during the postpartum period has negative implications for the well-being of the mother and has been linked to emotional and cognitive problems in the children of depressed mothers (Beck, 1998; Cummings & Davies, 1994). Given the deleterious effects of these psychiatric disorders in mothers on their newborn children, research identifying factors that put women at risk is essential. Current antepartum screening measures for postpartum depression and anxiety are inadequate (Austin & Lumley, 2003), and prenatal attachment may serve as a moderating variable (Priel & Besser, 1999). No research to date has looked at whether prenatal attachment in women hospitalized with high-risk pregnancies is predictive of postpartum depression or anxiety; the current study will look at these relationships.

Conclusion

Further investigation into these variables related to maternal-fetal attachment among women hospitalized during the antepartum period has the potential to build upon existing theory. In addition, women hospitalized for pregnancy-related complications may have easier access to psychological interventions. The findings of this study have the potential to guide research on treatment modalities. For the woman who reports poor dyadic adjustment with her mate, couple's counseling may facilitate communication about the pregnancy and ultimately lead to greater consensus. The woman who expresses ambivalence

about her pregnancy may benefit greatly from psychotherapy where she can learn to accept her mixed feelings associated with her pregnancy. Finally, effective predictors of postpartum depression and anxiety are limited, and prenatal attachment may prove to have some predictive utility, along with other factors, in identifying women at the greatest risk and, therefore, in need of psychological or psychiatric interventions.

CHAPTER TWO

Review of the Literature

Overview of Attachment Theory

Through decades of work, both independently and in collaboration with

one another, John Bowlby and Mary Ainsworth established attachment theory as a

persuasive and influential explanation for aspects of human development and

personality formation (Bretherton, 1992). Bowlby, trained as a physician and a

psychoanalyst, contributed substantially to the theory primarily through scholarly

inquiry, most notably in developmental psychology and ethology, and through

direct observation of mothers and children. Ainsworth, whose training in

psychology followed a research model, based much of her research on attachment

on Bowlby's theory. Both Bowlby and Ainsworth were instrumental in promoting

the acceptance of attachment theory by researchers and clinicians across many

disciplines who have an interest in the development of human personality

(Bretherton, 1992).

Bowlby proposed that an infant's desire for physical and psychological

interactions with a primary caretaker (usually the mother) is as innate as the need

for nourishment (1969). As such, infants are born with the capacity to demand

and sustain the attention provided by a caretaker through behaviors such as

clinging and smiling. Babies also exhibit behaviors aimed at gaining proximity to

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the caretaker, such as crying and following. Through investigation of animal studies of early mother-offspring exchanges and through his own observations as a clinician at the Tavistock Clinic in London, Bowlby became convinced that existing psychoanalytic and social learning theories did not account for infant behavior during separations from the primary caretaker. He was struck by the mounting evidence that proximity to a caretaker was not behavior learned simply to obtain food, nor could gratification of libidinal drives explain the special relationship formed between mother and child. Consequently, Bowlby decided to examine the effects of extensive separations of mother and child. By comparing a group of juvenile criminals with matched controls, he discovered that lengthy separations from the mother or maternal deprivation without a separation were much more common among the criminal group (Bowlby, 1944). He further noted that those with substantial maternal deprivation or separation appeared detached and emotionless.

Through his observations and the observations of his colleagues, Bowlby proposed that children go through three stages when separated from their primary caretaker (1969). Initially, the infant becomes distressed and protests against the separation through the activation of attachment behaviors. If these efforts fail to secure the mother's attention, the child will feel despair. After a prolonged separation the child appears emotionally apathetic; detachment is used as a defense against this painful separation. Informed by evolutionary biology in

formulating his theory, Bowlby believed that a set of attachment behaviors was inherited. These familiar activities, including crying, sucking, smiling, clinging, and following, serve an evolutionary purpose (Bowlby, 1969). Just as humans crave food and have sexual urges, so, too, do they exhibit attachment behaviors for the purpose of survival when frightened or when separated from their primary caretaker.

The goal of attachment behaviors is to maintain a sense of security through close contact with the caretaker. This security comes from a repertoire of caregiving behaviors exhibited by the mother with the goal of protecting her child. Bowlby (1969) described the attachment behavioral system in the child as complementary to the caregiving behavioral system in the mother. In contrast to psychoanalytic theories depicting the infant as passive and dependent, attachment theory suggests that the infant is quite active in attaining a sense of security in addition to getting physiological needs met. Another significant aspect of Bowlby's theory is that the interactions between parent and child form a cognitive map of intimate relationships (1973). If the early attachment relationship provides a balance of security and independence, the individual will likely perceive the self as important and autonomous. Conversely, an attachment relationship marked by unavailability or excessive protection may lead to feelings of worthlessness or inadequacy. Finally, the cognitive maps formed by early attachment relationships

not only impact children's relationships with important others throughout life, but also get passed on to the next generation of children (Bowlby, 1973).

Ainsworth agreed with much of Bowlby's thinking; however, she was inspired to study these ideas systematically in order to test their validity, as well as to use empirical data to refine and to expand the theory. Incorporating Bowlby's ideas about attachment and her knowledge of research on security from her graduate studies, Ainsworth observed 28 mother-infant dyads over nine months in Uganda (1963). Although her original intent had been to study the customary separation of mother and child at weaning among this population, she observed that this practice was less common than she had anticipated. Ainsworth, having spent considerable time and energy acquiring the consent of the families, quickly shifted her focus to the development of the attachment bond. Through her close observations and her detailed notes, she noticed that babies were quite active in seeking proximity to their mothers. She also observed behavior that supported the notion that the mother serves as a secure base from which the infant may explore the world while maintaining a sense of safety. The differences she noticed in the initiation and termination of attachment behaviors among the infants led her to classify the quality of the bond between mother and child. She observed that babies who appeared more secure had mothers who had shown more sensitivity to their needs (Ainsworth, 1963). This research was critical to Bowlby's evolving theory of attachment.

Ainsworth conducted further longitudinal research in the United States. With the assistance of several researchers, she followed mother-infant dyads from birth to one year by making home visits to observe interactions between mother and baby (e.g., Ainsworth, Bell, & Stayton, 1971). At the end of the first year, the children and their mothers participated in what became a landmark study in developmental psychology, the strange situation. This experiment provided the opportunity to see how children responded with attachment behaviors to separation from their mothers, as well as to see how they responded when reunited with their mothers in a controlled environment. Ainsworth found that babies whose mothers provided prompt, consistent responses to their attachment behaviors during the first year tended to be securely attached at age one.

Secure attachment, as observed in the strange situation study, was marked by less distress during brief separations from the mother, as well as more positive affect upon her return (Ainsworth & Bell, 1970). Babies who showed insecure attachment were less likely to experience their mothers as comforting (Ainsworth, Blehar, Waters, & Wall, 1978). Avoidant babies sought their mothers while she was absent, yet appeared indifferent upon her return. Ambivalent/resistant babies wanted contact with their mothers when they returned, but were not easily consoled.

Bowlby and Ainsworth believed that early interactions between an infant and a caregiver are reflected in later interactions with others. John Bowlby's early

observations of boys separated from their mothers led him to speculate that this early interruption in the mother-child relationship was a likely contributor to later psychopathology (1973). Bowlby viewed attachment behavior as a biologically-driven set of behaviors designed to maximize proximity of infant and caretaker and thereby ensure the infant's safety. Analysts took issue with this model of infant behavior, feeling that it was too reductionistic. Mary Ainsworth, in her pioneering work in the field of attachment, demonstrated that children internalized expectations they had of their primary caretakers. As the infant becomes a toddler and child, physical closeness is replaced by a sense of psychological security or expectation of the availability of the primary caretaker (Ainsworth, Blehar, Waters, & Wall, 1978). This extension of attachment theory illustrated that children may form cognitive maps of their important early caretaker relationships. These mental representations have significant relevance to a child's perception of himself in relation to others. Ainsworth extended attachment theory research to relationships beyond the parent-child bond, while Bowlby began formulating specific therapeutic interventions derived from attachment theory.

Attachment theory grew out of empirical observation and provides plausible explanations for the development of some psychopathology. In *Attachment and Loss, Volume I: Attachment*, John Bowlby wrote:

Thus we reached the conclusion that loss of mother-figure, either by itself

or in combination with other variables yet to be clearly identified, is

capable of generating responses and processes that are of the greatest

interest to psychopathology. Not only so, but these responses and

processes, we concluded, are the very same as are known to be active in

older individuals who are still disturbed by separations that they suffered

in early life (1969, p. xiii).

Longitudinal studies have in fact linked insecure attachment with multiple

forms of psychopathology (Weinfield, Sroufe, Egeland, & Carlson, 1999).

Although initially faced with considerable criticism from the psychoanalytic

community, attachment theory eventually gained acceptance as psychoanalysts

realized the importance of empirical support for their clinical efforts. Both fields

can benefit greatly from one another. While psychoanalysis can build upon the

observations of attachment research, attachment theory can continue expanding in

scope in order to better understand human personality from a developmental

perspective (Fonagy, 2001).

Prenatal Attachment as a Construct

Although attachment theory and research have focused predominantly on

the child's attachment to the parental figure and the effects attachment behaviors

have on the caregiver's responsiveness, the implications of a mother's attachment to her fetus have received increasing attention in recent decades. Psychoanalytic theorists, including Deutsch, Winnicott, Bibring, and Benedek, had made reference to the idea of a mother's investment of energy toward her unborn child; however, Rubin provided the first connection between specific prenatal tasks and the immediate postpartum bond between mother and child (Rubin, 1967; 1975). As a nurse studying maternal behavior during pregnancy, Rubin referred to pregnancy as a time when the mother turns her energy from the outside world to the developing fetus inside her. Her sensory experiences are enhanced, and her cognition is clearer. She is more sensitive to cues around her. Four concurrent tasks are worked on during the course of pregnancy: seeking safe passage for mother and child throughout pregnancy, labor, and delivery; ensuring acceptance of the baby by significant others; binding-in to her unknown child; and learning to give of herself (Rubin, 1975). This articulation of specific prenatal maternal tasks led the way for the exploration of a woman's psychological preparation for welcoming a child into the world.

While Rubin's observations focused on behavioral and emotional aspects of a pregnant woman's experience, an Australian researcher investigated how women conceptualized their fetuses over the course of their first pregnancy (Lumley, 1982). She followed 30 women during each trimester of pregnancy and found that a woman's perception of her fetus became increasingly human-like

over the course of the pregnancy. She found that 30% of the women in her study thought of the fetus as a "real person" during the first trimester, while 63% and 92% could imagine the fetus as a real person during the second trimester and at 36 weeks gestation, respectively (Lumley, 1982). The women who thought of the fetus as a real person during the first trimester were more likely to anticipate that spontaneous abortion would cause them intense grief. They were also more likely to talk to their fetus and to rub their bellies at 36 weeks gestation. Conversely, women who could not picture their baby as a little person even after feeling the fetus move were less likely to anticipate a grief response upon losing the baby and reported less activity in preparing for the baby's arrival (Lumley, 1982). In another study, Lumley (1990) examined the effect of an ultrasound image of the fetus on the mother's thoughts about the fetus. She found that women were more likely to view the baby as a separate, human individual upon seeing the image.

Leifer (1977) published findings of a prospective study of 19 white, middle-class primigravidas (women pregnant for the first time) with no history of gynecologic or psychiatric complications and who were living with their husbands. These women were interviewed during each trimester of their pregnancy and at three days and two months postpartum. A questionnaire was mailed out at seven months postpartum. There was an association between low levels of attachment to fetuses toward the end of pregnancy and lower attachment to their babies at seven months postpartum. Leifer concluded:

Thus it appears that maternal feelings develop along a continuum throughout pregnancy. The fantasies developed toward the fetus and the preparatory behaviors are functionally significant in the development of maternal bonds to the infant and in psychological preparedness for motherhood. It appears that a significant task of pregnancy is the incorporation of the fetus; the degree to which this is accomplished by the end of pregnancy is predictive of early maternal behavior and attitudes (1977, p. 79).

This connection between prenatal attachment and maternal-infant interactions has undoubtedly inspired continued interest in the study of maternal-fetal attachment.

While a graduate student in nursing, Mecca Cranley (1979) conducted the first comprehensive review of literature related to maternal-fetal attachment in writing her doctoral dissertation. Based on her review of the existing literature and input from a panel of experts, Cranley developed a multi-factorial model of prenatal attachment comprising six subscales: differentiation of self from fetus, interaction with fetus, attributing characteristics and intentions to fetus, giving of self, role-taking, and nesting. Her definition of maternal-fetal attachment was the first widely-recognized description of this construct: "the extent to which women engage in behaviors that represent an affiliation and interaction with their unborn child" (Cranley, 1981, p. 282).

Based on her multidimensional conceptualization of maternal-fetal attachment, Cranley constructed the first quantitative measure of prenatal attachment, the Maternal-Fetal Attachment Scale (MFAS; Cranley, 1979; 1981). Although her research led to a six-factor scale, an item analysis resulted in the elimination of the nesting subscale and 13 items, leaving a 24-item inventory with five subscales (Cranley, 1981). The internal consistency of the total scale was .85, while the subscales ranged from .52-.73. Perhaps because it was the first instrument to measure this construct, it remains in wide use (Beck, 1999), even though its validity and utility have been questioned (Condon, 1993; Mercer & Ferketich, 1994; Muller, 1992).

Cranley's definition of maternal-fetal attachment explicitly mentions behavior (1981). Muller, another researcher in the nursing field, felt that this conceptualization of prenatal attachment was too limited, and she expanded the concept to "the unique, affectionate relationship that develops between a woman and her fetus" (Muller, 1993, p. 201). Using this definition, Muller reviewed the literature on pregnancy adaptation and attachment to develop a new instrument, the Prenatal Attachment Inventory (PAI). This measure was designed to reflect Muller's conceptualization of antenatal attachment, which differed from Cranley's definition and instrument in that it did not focus on maternal behaviors (Muller, 1993). The PAI was designed to measure the prenatal relationship as a

single factor independent of the woman's feelings about pregnancy or motherhood (Muller, 1993).

John Condon also found Cranley's definition of maternal-fetal attachment and the MFAS inadequate (Condon, 1993). He pointed out some of the inconsistencies found in the antenatal attachment research and concluded the following regarding the MFAS: "In summary, scores on this instrument do not appear to behave in a predictable fashion in accord with either prevailing theory or common sense" (Condon, 1993, p. 169). Specifically, he criticized the MFAS for measuring a woman's attitudes toward the state of being pregnant and toward being a mother rather than focusing on attachment to the fetus. Consistent with Bretherton's definition of attachment as an "emotional tie" or a "psychological bond" to an object, Condon conceived of the core of attachment as love (Bretherton, 1985; Condon, 1993). In his development of a measure of maternal-fetal attachment, the Maternal Antenatal Attachment Scale (MAAS), he identified five dispositions that he felt reflected attachment to or love toward the fetus: the disposition to know, to be with/interact with, to avoid separation or loss, to protect, and to gratify needs (Condon, 1993). In a later article, Condon and Corkindale used a more parsimonious definition of prenatal attachment: "the emotional tie or bond which normally develops between the pregnant woman and her unborn infant" (1997, p. 359). Cranley's original definition of MFA was thus

challenged by two similar definitions of the construct (Condon, 1993; Muller, 1993).

The Prenatal Maternal Attachment Scale is a fourth measure that appears in the literature on the measurement of prenatal attachment, but it has only been used in one study that appeared in a peer-reviewed journal (Fowles, 1996). The two questionnaires used most often to measure antenatal attachment are Cranley's Maternal Fetal Attachment Scale and Condon's Maternal Antenatal Attachment Scale (Laxton-Kane & Slade, 2002).

Most recently, Doan and Zimmerman (2003) proposed a definition of prenatal attachment that reflects the developmental aspect of attachment theory. "Prenatal attachment is an abstract concept, representing the affiliative relationship between a parent and fetus, which is potentially present before pregnancy, is related to cognitive and emotional abilities to conceptualize another human being, and develops within an ecological system" (Doan & Zimerman, 2003, p. 110). Their definition highlights the following: 1) pregnancy is only part of a developmental process that begins prior to and continues after pregnancy, 2) attitudes and skills that come to bear on the pregnancy are present prior to the pregnancy, 3) the ability to think abstractly about a human may impact one's level of attachment, 4) emotional factors are important in the formation of prenatal attachment, 5) prenatal attachment involves the interplay of emotional, cognitive, and ecological factors, 6) intervention should address all factors and may be

effective during pregnancy (Doan & Zimerman, 2003). This most recent

conceptualization of prenatal attachment is quite comprehensive and touches on

many aspects of Bowlby and Ainsworth's theory, including a developmental

perspective, the notion of a cognitive model of intimate relationships, the

intergenerational nature of attachment, and the potential for psychological

intervention to improve the quality of interpersonal relationships.

The Significance of Prenatal Attachment

Although Bowlby's original theory focused on the attachment behaviors

of the child in the context of the mother-infant dyad, it became clear to Ainsworth

through her observations that the attachment categorization of the baby at one

year had a great deal to do with the mother's sensitivity in responding to those

behaviors (Ainsworth & Bell, 1970; Ainsworth, Bell, & Stayton, 1971)**.** In *The*

Secret Life of the Unborn Child, Verny and Kelly (1981) make a compelling

argument that the examination of the mother's influence on the psychological

well-being of her child should be extended from after birth to the prenatal period.

By piecing together findings from various studies, they concluded that the

maternal experience during pregnancy has a profound impact on the unborn fetus.

One way a mother and her fetus "carry on an emotional dialogue" is

through levels of neurohormones in the mother's bloodstream that get passed on

to the fetus (Verny & Kelly, 1981, p. 55). They conclude that maternal stress,

which potentiates the autonomic nervous system (ANS-the "fight or flight"

response), can cause various problems in the development of a fetus, resulting in

problems postnatally: "Excessive maternal neurohormonal secretion creates an

overcharged ANS, which leads to low weight at birth and/or gastric disorders

and/or reading difficulties and/or behavioral problems" (p. 59). Evidence from

case reports and personal correspondence led the authors to conclude that

communication between mother and fetus occurs through physiological,

behavioral, and sympathetic channels in both directions. What occurs prior to

birth affects the baby considerably.

> In fact, what emerges from all these new reports is a picture of a human
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> intrauterine bonding system at least as complex, graded and subtle as the
>
> bonding that occurs after birth. Indeed, they are part of the same vital
>
> continuum: What happens after birth is an elaboration of, and depends on,
>
> what happens prior to it (Verny & Kelly, 1981, p. 75).

The mother's psychological state during pregnancy has broad implications for the

development of the child in utero, as well as postnatally.

It is undeniable that in the absence of observable behaviors of the child,

prenatal attachment is distinct from the attachment behaviors articulated by

Bowlby. However, in light of the intergenerational transmission of cognitive

models of relationships, it seems that what can be observed in the mother-child

dyad after birth may have a prenatal correlate that can be measured. A study

conducted by Fonagy, Steele, and Steele (1991) used a measure to classify the attachment styles of 100 pregnant women. They found that in 75% of the participants, the woman's level of object representation during pregnancy—ascertained through an interview asking about her own childhood experiences—predicted the classification of her baby at one year in the strange situation experiment. This finding strongly suggests that a woman's perceptions of her own early relationships have an impact on her interactions with her infant. Another study found that a pregnant woman's anticipated relationship with her infant elicited through a structured interview predicted the baby's strange situation classification at 12 months with 74% accuracy (Benoit, Parker, & Zeanah, 1997). What remains unclear is whether a woman's responses to a self-report questionnaire during her pregnancy can similarly predict her sensitivity toward her infant.

Fuller conducted a study comparing MFAS scores during the 35th to 40th week of pregnancy with observations of mothers feeding and interacting with their infants on the second and third postpartum days (Fuller, 1990). She found that a mother's attachment to her fetus was positively correlated with more engaged mother-infant interactions, such as sensitivity to cues, eye contact, physical closeness, and verbal stimulation. Muller looked at a woman's level of prenatal attachment using the Prenatal Attachment Inventory and compared these scores with responses on the Maternal Attachment Inventory, a self-report

measure of postnatal attachment that she created (Muller 1994; 1996). She found

a significant positive correlation between prenatal and postnatal attachment as

measured by these self-report questionnaires (Muller, 1996). Leifer (1977) found

a correlation between reported prenatal attachment on an unpublished measure

and reported attachment to the baby at seven months. In another study, there was

a significant association between a mother's responses to an antenatal attachment

inventory during the third trimester of pregnancy and her observed interactions

with her infant at 12 weeks postpartum (Siddiqui & Hagglof, 2000). These studies

provide support for an association between a woman's reported prenatal

attachment and her feelings and behaviors toward her infant during the days or

months after giving birth.

While several researchers have identified associations between prenatal

and postnatal attitudes and behaviors, a couple of researchers investigated how

prenatal attachment can be related to hostile feelings toward the fetus. Pollock and

Percy (1999) examined 40 multiparous pregnant women who were referred by

government agencies for an evaluation of parenting abilities and

psychopathology. All but one of these mothers had a child removed from her

home by a social service agency. The mean score for global maternal antenatal

attachment on the MAAS for this group of women was significantly lower than

the mean for the group of women from a general pregnant population as reported

in Condon & Corkindale's 1997 study (50.2 versus 75.5). Women who scored

lower on the quality of attachment scale showed a non-significant trend toward thoughts of harming the fetus, irritation with the fetus, and anticipated loss of control and subsequent injury to the baby (Pollock & Percy, 1999). This finding is not surprising given that this sample was presumably selected due to the pregnant women's maltreatment of their children.

Pollock and Percy (1999) failed to consider the effects of gestational age on MAAS scores in their study, as gestational age has been one of the few consistent correlates of maternal-fetal attachment regardless of the instrument used or the methodology of the study. The women in their study were more or less equally distributed over the three trimesters, while all of the women in Condon and Corkindale's study (1997) were in their third trimester. Thus, the trend that they saw in their study may have reached significance had they taken gestational age into consideration. Despite this limitation to their study, the findings indicate a contemporaneous relationship between low prenatal attachment to an unborn fetus and poor mothering behaviors with other children.

Utility of Knowing Level of Prenatal Attachment

Following the literature describing pregnancy as a stage of preparation for a new baby, the antenatal period seems to be an opportune time to assess a mother's potential responsiveness to attachment behaviors that will be displayed by her infant. There is a clinical opportunity in light of the research to date to

intervene through psychoeducation and, perhaps, psychotherapy and/or couple's counseling during pregnancy in order to facilitate a healthy bond between mother and infant. A few studies have looked at psychoeducational and behavioral interventions.

One researcher looked at whether a prenatal intervention would affect postnatal maternal behaviors (Carter-Jessop, 1981). Ten healthy primiparas, between 32 and 37 weeks gestation, were randomized into an experimental group ($n = 5$) and a control group ($n = 5$). The women in the experimental group received two or three sessions of an attachment intervention, comprising instructions to feel for the fetus's body parts and position daily, to pay close attention to fetal activity, and to rub, stroke, and massage their bellies. At 2-4 days postpartum, specific maternal activities were recorded for both groups of women, including eye contact, touching, and talking. The group that received the intervention showed significantly more of these behaviors than the control group. She concluded that the attachment process is likely present in the third trimester and can be enhanced through intervention (Carter-Jessop, 1981).

Carson and Virden (1984) attempted to replicate the study by Carter-Jessop with a larger, ethnically diverse sample. The women in their study were both primiparas and multiparas; some had high-risk pregnancies. In addition, the amount of childbirth education they had received was not considered. Although there was a nonsignificant trend between the interaction of treatment group and

parity on postnatal attachment behaviors, the only statistically significant finding was that white women demonstrated more attachment behaviors with their children postnatally compared to black women (Carson & Virden, 1984). They noted that this may be due to cultural differences or the fact that the observer of attachment behaviors was white. There was no mention of whether the intervention had a significant effect on white women's interactions with their infants in this study. The finding of a trend in the interaction between treatment group and parity suggests that women may have different needs depending on their parity. For example, it appeared that learning relaxation techniques prenatally helped multiparas' mood postnatally, while learning to palpate the abdomen for the fetus prenatally helped to facilitate attachment behaviors in primiparas postpartum. Finally, the postpartum observations occurred between two and four days after delivery in the Carter-Jessop study, while some women in this study were not observed until 16 days postpartum. Although there were differences in methodology between the two studies, neither study included a measure of prenatal attachment to compare with postnatal behaviors.

Another prenatal behavioral intervention was conducted by Mikhail and colleagues to determine whether it would have an effect on scores of MFA (Mikhail, Freda, Merkatz, Polizzotto, Mazloom, & Merkatz, 1991). Women attending an urban prenatal clinic who had uncomplicated pregnancies and were between 28 and 32 weeks gestation were approached to participate in the study. A

total of 213 women were randomized into one of two treatment groups or a control group. Both treatment groups involved learning to count and to track fetal movements daily for one month. The control group received standard care. At the end of the month, all participants completed the MFAS. Total scores on the MFAS in both intervention groups were greater than the attachment scores in the control group but did not differ significantly from one another (Mikhail et al., 1991). The authors concluded that behaviors such as counting fetal movements may increase the mother's adaptation to pregnancy and, ultimately, her attachment with her infant.

Whether these or similar prenatal interventions have any lasting effects will require longitudinal studies beginning during pregnancy through the first postpartum year. Until interventions conducted during pregnancy can be shown to influence interactions between mother and child over time, such as in the strange situation experiment at 12 months, there will be insufficient support for utilizing them in practice as well as for continuing short-term studies on their effectiveness. A mother's bond with her fetus is extremely complex and multifactorial, as evidenced by the wide range of studies on correlates of prenatal attachment. While increasing a woman's awareness of her fetus may result in transient changes in her attitude or behavior, there are other variables that play a role in this bonding process, including the support a woman receives from her husband or romantic partner and whether the pregnancy was planned.

Effect of Mate Relationship on Prenatal Attachment

In our present culture, where families are increasingly geographically separated, the primary romantic relationship takes on an even greater social role. The quality of a marriage or of another significant dyadic relationship has substantial implications for the couple involved. It has been noted that the addition of a baby to this relationship is a time of great transition and, in many cases, crisis (Dyer, 1963; LeMasters, 1957). A couple's ability to navigate this change has great bearing on the quality of the relationships within the new family. Although the greatest adjustment follows the birth of the child, learning about the pregnant state and dealing with pregnancy also require adaptation.

Bowlby, in the third volume of his *Attachment and Loss* series (1980), wrote that expectant mothers yearn for the love and support of their partners. He suggested that feeling loved by her partner increases a woman's capacity to love her child. Lumley (1982) found an association between a woman's ability to conceptualize her fetus as a human and a positive relationship with her spouse. A study by Porter and Demeuth (1979) examined the association between a couple's relationship and their attitude toward pregnancy under the premise that "a woman accepts a pregnancy well if she feels it brings her closer to her husband and rejects it if it does not" (p. 104). They note that a woman's pregnancy is also a time of psychological adjustment for the father, not only in relation to the baby,

but also in adapting to psychological changes in the woman: "Thus, the state of marital adjustment at the time the pregnancy occurs will help to determine the couple's reaction to the pregnancy" (Porter & Demeuth, 1979, p. 105).

The participants in their study were 25 cohabitating couples pregnant for the first time and recruited from the office of an obstetrician (Porter & Demeuth, 1979). Both members of the couple completed the Dyadic Adjustment Scale and a measure of acceptance of the pregnancy. Each couple also completed a demographic information sheet. There was a statistically significant correlation between dyadic adjustment and acceptance of the pregnancy for women ($r = .57$, $p < .01$). Husbands' responses showed an even stronger association between these two variables ($r = .76$, $p < .01$). It is interesting that no individual who rated pregnancy acceptance as high reported poor dyadic adjustment. However, low pregnancy acceptance was seen with both low and high dyadic satisfaction. When scores for women and men were combined, a strong correlation remained between martial satisfaction and pregnancy acceptance ($r = .75$, $p < .01$).

A similar study with a larger sample was conducted with 106 women who were recruited from an antenatal clinic at an Armed Forces medical center (Snowden, Schott, Awalt, & Gillis-Knox, 1988). During their first prenatal appointment, participants were given a packet of questionnaires, including questions about marital satisfaction and attitudes toward pregnancy. At 34 weeks gestation, participants were given an identical packet to fill out and to mail in.

There was not a significant difference in marital satisfaction between the two time points. At the initial prenatal visit, self-report measures of marital satisfaction were correlated with wanting the pregnancy, planning the pregnancy, and agreeing with the father on the pregnancy. These correlations were not as strong at time 2, although they remained statistically significant. "Wantedness, intendedness, and agreement in deciding to become pregnant continued to predict marital satisfaction when assessed immediately prior to the scheduled delivery" (Snowden, Schott, Awalt, & Gillis-Knox, 1988, p. 330). It is not surprising that feelings about a major life change were associated with the quality of the relationship that had been greatly impacted by the pregnancy.

The association between satisfaction with one's partner and the acceptance of pregnancy also has implications for the postpartum period for both the couple and for the child. Tietjen & Bradley (1985) studied 23 primiparous married women who were recruited from prenatal education classes. Women were mailed packets of questionnaires during the 35th week of pregnancy (time one) and again at three months postpartum (time two). Variables measured included depression, anxiety, perceived stress, marital adjustment, and attitude toward pregnancy (time one) and toward the baby (time two). Women who reported higher levels of support from their husbands during pregnancy had fewer symptoms of depression and anxiety and reported lower levels of stress and better marital adjustment. There was a non-significant trend between perceived support from the husband

and a positive attitude toward the pregnancy ($r = .33, p < .10$). Poor marital adjustment was associated with higher levels of anxiety and a negative attitude toward pregnancy. The burden of marital discord during an already stressful period certainly has broad implications, including impacting the woman's relationship with her fetus.

In 1981, Cranley conducted a study on women between the 35th and 40th weeks of pregnancy (Cranley, 1981b). The 30 participants were interviewed in their homes and given self-report measures to fill out. All women had full-term infants who were healthy. Although a published instrument was not used to assess social support, questions regarding the woman's social support system were asked as part of the interview and were quantified. The correlation between reported levels of social support and MFAS scores was significant ($r = .51, p < .01$). Based on the content of the responses to interview questions concerning social support, Cranley noted: "Husbands were mentioned most often in this respect, and they assisted their wives in the form of household chores and shopping, as well as monitoring their diets and activities, support these men had not provided when their wives were not pregnant or had provided to a lesser extent" (1981b, p. 67). These women reported a noticeable change in their husbands' behavior during pregnancy, which was associated with increased maternal-fetal attachment.

In a study by Zachariah (1994b), 115 women were recruited from prenatal classes at a health department. All were married and cohabitating with their

husbands, had no prior viable pregnancies, and were at least 28 weeks into their pregnancies. A 10-item subscale on a self-report measure tapped into a woman's perception of her relationship with her husband in terms of empathy, support, and closeness. Social support and psychological well-being were assessed through additional self-report measures. A woman's reported attachment with her husband was significantly correlated with her reported psychological well-being. The husband-wife relationship proved to explain the greatest variance in psychological well-being, even when compared to the woman's relationship with her mother. Once these two relationships were controlled for, social support no longer was associated with psychological well-being. This study emphasizes the importance of the primary relationship as a form of social support during pregnancy.

Zachariah (1994a) used this sample in another study to compare a woman's attachment in the marital relationship directly with her attachment to the fetus. A 10-item subscale from a self-report questionnaire was used to measure husband-wife attachment. Total score on the MFAS was used to measure prenatal attachment to the fetus. No association was found between the measures of husband-wife and maternal-fetal attachment in this study; however, Condon & Corkindale (1997) found a positive association between scores on the Maternal Antenatal Attachment Scale (MAAS) and on the Dyadic Adjustment Scale (DAS). Rather than measuring the degree of empathy and support a woman received from her partner, as in the Zachariah study (1994a), the DAS is designed

to assess the overall functioning of a relationship. Scores on the DAS were significantly correlated with global MAAS scores ($r = .22$, $p < .01$; Condon & Corkindale, 1997).

A subsequent study looked at 75 low-risk women during the third trimester of pregnancy (Wilson, White, Cobb, Curry, Greene, & Popovich, 2000). Women were recruited from antenatal clinics and from birthing classes and completed self-report inventories. Measures of family dynamics and maternal-fetal attachment were utilized. No differences were found between families having their first or second child, so data were combined for analyses. Using multiple regression to account for the variance in maternal-fetal attachment, they found that demographic variables accounted for 11.3% of this variance. After controlling for the demographic variables, a woman's score on perceived mutuality (her sense of closeness and intimacy with her partner) was the only variable that contributed significantly to MFAS scores (Wilson et al., 2000).

This relationship has also been examined in younger mothers. Wayland and Tate (1993) had 61 primiparous adolescents (ages 14-20 years) with medically uncomplicated pregnancies complete the MFAS and provide demographic data and information about the baby's father. This sample of women was ethnically diverse. The mean gestational age of the fetus at the time of completion of study measures was 31.5 weeks. Overall MFAS scores were associated with stability in the relationship between the mother and the baby's

father, including frequency of visits by the baby's father, being married to the

baby's father, and perceiving the relationship with the father as close.

A recent study by Zachariah (2004) highlights the importance of the

marital relationship both during pregnancy and after the birth of the child.

Twenty-five women completed questionnaires at two time points, between 14-22

weeks and 28-42 weeks gestation. Measures included the Prenatal Attachment

Inventory and the Autonomy and Relatedness Inventory. Psychological well-

being was significantly correlated with attachment to the husband during both

middle and late pregnancy, while attachment to the fetus was correlated with

psychological well-being late in the pregnancy. She concluded: "The positive

mate relationship appears to offer the most extensive support available to mothers

during pregnancy and the first year after the baby is born and this resource cannot

afford to be damaged or strained" (Zachariah, 2004, p. 65). The quality of the

couple's relationship affects not only the mother, but the baby as well.

Perhaps the most striking findings concerning the primary dyadic

relationship are from a study by Owen and Cox (1997). They observed infants'

attachment styles and compared them to the level of marital conflict. This study

revealed that when marital conflict appeared high, there was more evidence for a

disorganized attachment style in the infant, independent of each parent's level of

ego development and parenting behaviors. The authors concluded that this is the

result of the parental figures appearing frightened, as well as frightening the

infant, thereby increasing the need for security when they are supposed to be the source of that security. While this finding concerns the infant rather than the fetus, it underscores the importance of a healthy relationship between a child's parents. If conflict exists prior to the child's birth, this may negatively impact the mother's ability to connect with the fetus. It is also an opportunity to address the conflict through interventions such as couple's counseling. This would benefit the entire family system by facilitating attachment between the parents and, consequently, between the infant and the primary caretakers.

Several studies have investigated the relationship between maternal-fetal attachment and a woman's relationship with her husband or her partner; however, only one study has looked at the effect this relationship has on women who have the added stress of hospitalization during pregnancy and the increased probability of a premature or nonviable baby (Mercer, Ferketich, May, DeJoseph, & Sollid, 1988). This study used the MFAS to measure maternal-fetal attachment and an instrument designed specifically to measure marital adjustment and looked at women with both low- and high-risk pregnancies. Mate relationship was related to maternal-fetal attachment in low-risk women, but not in high-risk women. Because the relationship between these two variables has been mixed in studies to date and because it has only been examined in one sample of hospitalized women, the current study will investigate the association of these two factors.

Attitude Toward Pregnancy

Regardless of a woman's intention to become pregnant, ambivalence often accompanies the discovery that one is actually bearing a child. Not only are mixed feelings toward pregnancy a common phenomenon, they are considered normal in women expecting a child (Kero & Lalos, 2000). It stands to reason that a woman who has an unintended pregnancy would either be inclined to terminate the pregnancy or would have greater feelings of ambivalence toward the unborn child compared to a woman who planned or wanted the pregnancy. Given the wide availability of multiple forms of contraception in the United States, the rates of unplanned pregnancies are surprisingly high.

According to the National Survey of Family Growth, in 2001, an estimated 6.4 million pregnancies were reported in the United States (Finer & Henshaw, 2006). Of these pregnancies, 4.0 million resulted in births, while 1.3 million were aborted and 1.1 million fetuses were lost during pregnancy. Of the 6.4 million pregnancies, 3.1 million pregnancies, or 49 percent, were reported as "unintended." The authors used this term to refer to women who did not want to become pregnant at the time they did as well as to women who reported that they never intended to become pregnant. Women who expressed ambivalence toward their pregnancies were considered to have an "intended" pregnancy. Unintended pregnancies were far more common among unmarried women compared to married women (74% versus 27%). However, the abortion rate among married

women with unintended pregnancies was 27% as opposed to 58% among

unmarried women. While the overall rate of unintended pregnancies in the United

States remained constant between 1994 and 2001, rates of unintended pregnancy

changed within specific demographic groups. The demographic groups that had

the largest increase over this period included: women aged 18-24, low-income

women, women who were unmarried but cohabitating, and non-white women.

Recognizing the disparity in unplanned pregnancies based on demographic

and socioeconomic variables, Kost, Landry, and Darroch (1998) wanted to

delineate whether certain outcome variables were the product of an unplanned

pregnancy, or whether the demographic and socioeconomic variables could

account for the outcomes. Specifically, they looked at whether the wellbeing of

the newborn and the mother's health-related behaviors affecting the infant are the

result of an unplanned pregnancy or the result of demographic and socioeconomic

differences. Data were obtained from the 1988 National Maternal and Infant

Health Survey through questionnaires mailed to a sample of women 15-44 years

old who were representative of the U.S. population, and from the 1988 National

Survey of Family Growth through personal interviews with a smaller, but

representative sample.

The authors analyzed data from singleton births where the baby was taken

home from the hospital and lived for at least one month (Kost, Landry, &

Darroch, 1998). Their operational definition of negative birth outcome was based

on gestational age (<37 weeks), birth weight (<2,500 grams), and whether the newborn's weight was low for gestational age (less than 10th percentile). Additional outcome variables included whether the infant was taken to a physician for well-baby care during the first three and first six months postpartum and whether the mother breastfed her baby. Births were classified into one of three categories: intended-woman wanted to become pregnant at that time; mistimed-woman wanted to become pregnant at some future point; and unwanted-woman did not want any or another child.

Based on data from the National Maternal and Infant Health Survey, newborns were at significantly greater risk for low birth weight, prematurity, and/or being small for gestational age if the mother reported that the pregnancy was unwanted (26%) versus a mistimed pregnancy (20%) or an intended pregnancy (16%; Kost, Landry, & Darroch, 1998). Babies from unwanted pregnancies were less likely than babies of mistimed and intended pregnancies to receive well-baby care and to be breastfed. When multivariate analysis controlled for demographic and socioeconomic factors, the differences seen in mistimed pregnancies were no longer statistically significant from wanted pregnancies. In addition, when prenatal maternal behaviors, such as smoking and drinking, were controlled for, the effect of pregnancy intention became non-significant. It should be noted, however, that women who reported smoking during pregnancy were nearly twice as likely as nonsmokers to have babies with negative health

outcomes (OR = 1.89, *p* < .01) (Kost, Landry, & Darroch, 1998). All of these

statistical controls appear to have diluted the significant finding that a woman's

intention to become pregnant has important ramifications for her behaviors during

pregnancy, the health of the newborn, and her behaviors related to the infant's

care. Although demographic and socioeconomic factors cannot be ignored, asking

a woman whether her pregnancy was planned, mistimed, or unwanted appears to

be a parsimonious way to determine who might be at greater risk and, therefore,

be in need of additional intervention during pregnancy.

Another study compared 53 women with normal pregnancies and 32

women with high-risk pregnancies (Kemp & Page, 1987a; 1987b). All women

were married and in their third trimester of pregnancy. Of the normal pregnancies,

70% had been planned, while only 47% of the high-risk pregnancies had been

planned. Whether this discrepancy is the result of prenatal maternal behaviors,

such as smoking or drinking, and whether these behaviors are influenced by a

woman's attitude toward being pregnant, are unknown. It is interesting, however,

that they found no difference in MFAS scores between low- and high-risk

women. The high-risk women in this sample did not require hospitalization, so the

level of ambivalence toward the pregnancy may not have been as intense as in a

hospitalized population (Leichtentritt, Blumenthal, Elyassi, & Rotmensch, 2005).

As noted earlier, ambivalence toward pregnancy is by no means limited to

high-risk populations. In fact, some women who have unplanned pregnancies

attempt to harm the fetus. A study by Kent, Laidlaw, and Brockington (1997) looked at physically healthy women who tried to harm their fetuses by punching their abdomens. All five women expressed ambivalence toward their pregnancies, and four of the five reported that the pregnancies were unplanned and that they had considered termination of the pregnancy.

In a longitudinal study of 140 pregnant Japanese women, public health nurses visited their homes and provided pregnancy counseling and collected baseline information, including the baby's due date and whether the pregnancy had been intended or not (Goto, Yasumura, Yabe, & Reich, 2006). Questionnaires were mailed out to women approximately six weeks following the anticipated due date. This postpartum data included the Japanese version of the Maternal Attachment Inventory, a self-report measure of a woman's attachment to her infant. Other questions asked about the following: the woman's confidence in her ability to rear her baby, her availability to spend time with the child when feeling relaxed, whether and with whom she discussed childrearing practices, and whether she felt the child's father was cooperative in rearing the child. Of the 140 women in the study, 24 (17%) reported unintended pregnancies. Multiple logistic regression analysis was used to compare those who had planned and unplanned pregnancies, controlling for mother's age, occupation, and parity, father's occupation, child's weight at birth, and whether the couple lived with parents. Analyses revealed that women with unintended pregnancies had significantly

lower reported attachment to their infants and had less confidence in rearing their children compared to women with planned pregnancies. Women with unplanned pregnancies also reported having less time available to spend with their infants when they felt relaxed. They also reported that the child's father was less supportive in childrearing responsibilities.

This research strongly suggests that a woman's attitude toward pregnancy affects her feelings and behaviors related to her child both during pregnancy and after giving birth. If nearly half of all pregnancies are unplanned, and an unplanned pregnancy results in increased ambivalence toward the fetus, including considering terminating the pregnancy, there are likely disparities between maternal-fetal attachment in women with planned versus unplanned pregnancies. Laxton-Kane and Slade (2002) argue that an unwanted pregnancy could result in either higher or lower levels of prenatal attachment. "However, there has been no systematic research carried out into the relationship between prenatal attachment levels and the planning of pregnancy" (Laxton-Kane & Slade, 2002, p. 257). This is a variable that warrants further investigation in light of the troubling, albeit limited, research to date.

Depression Following Pregnancy

Postpartum depression is a major public health issue affecting between 10 and 15 percent of women (Mallikarjun & Oyebode, 2005). In a systematic review of 30 studies on perinatal depression, it was estimated that 14.5% of women have

a new episode of major or minor depression during the first three months

postpartum, while 6.5% have a new episode of major depression during the same

period (Gaynes et al., 2005). A meta-analysis of nine studies found a significant

relationship between depression in women during the postpartum period and

emotional, cognitive, and behavioral problems in their children from age one to

fourteen years (Beck, 1998). Although antepartum depression has been linked to

postpartum depression, Austin and Lumley (2003) concluded from their meta-

analysis of 16 studies that used antepartum assessment to predict postpartum

depression: "The need to define a predictive tool that is clinically useful and has

acceptable sensitivity and sensitivity [*sic*] remains. In order to achieve this it is

likely that a broader set of risk factors will need to be used" (Austin & Lumley,

2003, p. 16). Only two studies to date have examined the association between

prenatal attachment and postpartum depression.

In one study looking at the relationship between a mother's prenatal and

postnatal feelings toward her baby, her competency in the maternal role, and level

of postpartum depression, participants were 136 primiparas in their third trimester

of an uncomplicated pregnancy and who were living with the baby's father

(Fowles, 1996). Ninety-two percent of the women (125) were white, and 93%

(126) were married. The remaining 10 women (7%) were in a relationship.

Maternal prenatal attachment was measured by an unpublished scale that assessed

a woman's behaviors that were meant to reflect the mother's emotional feelings

toward and interaction with her fetus. The postnatal affective component was measured using the Edinburgh Postnatal Depression Scale. Measures of maternal role attainment were administered 9 to 14 weeks postpartum. Scales completed postnatally included a scale designed to assess the mother's subjective sense of having attained a maternal role and the mother's evaluation of her infant. Perceived competence items were related to feeding and other infant care tasks.

Reported maternal competence was high with a small distribution of responses (Fowles, 1996). Prenatal maternal attachment was associated with all three measures of maternal role attainment but not with postpartum depression, which was inversely related to all measures of maternal role attainment. Fowles concluded that "postpartum depression had a negative relationship with all measures of maternal role attainment and had a greater influence on changes in a mother's evaluation of her baby after birth than her feelings of affection toward the fetus during pregnancy" (1996, p. 80). One shortcoming of this study was that antepartum levels of depression were not controlled for.

Priel and Besser (1999) wanted to determine whether prenatal attachment had any moderating effects on depression during the postpartum period. Women attending routine prenatal visits were approached to participate in the study. Participants were 73 married primiparas with low-risk pregnancies, no prior miscarriages, and no psychiatric history. Measures included self-report questionnaires measuring vulnerability to depression, depressive symptoms

(Center for Epidemiological Studies Depression Scale, CES-D), and the quality scale from Condon's Maternal Antenatal Attachment Scale. Women completed study measures during the third trimester of pregnancy and the CES-D at eight weeks postpartum.

The scores on the MAAS quality scale during the third trimester were significantly inversely correlated with reported symptoms of depression on the CES-D both during the third trimester of pregnancy ($r = -.23$, $p < .05$) and at eight weeks postpartum ($r = -.36$, $p < .01$; Priel & Besser, 1999). Using hierarchical multiple regression analysis, Priel and Besser (1999) looked at the contribution of antenatal attachment to postpartum depressive symptoms while controlling for antepartum depressive symptoms. Even after controlling for CES-D scores at the first time point, antenatal attachment still explained 7% of the variance in CES-D scores at eight weeks postpartum (F change $[2,70] = 13.13$, $p < .01$). Although they noted that the moderating effect of antenatal attachment was particularly evident among women who were identified as highly self-critical, they concluded that "the facilitation of the creation of an affective bond to the fetus may constitute a worthwhile measure in the prevention and treatment of milder forms of postpartum depression" (Priel & Besser, 1999, pp. 250-251). This appears to be a variable worthy of further investigation, particularly in light of Austin and Lumley's (2003) call for a tool with predictive value for postpartum depression. Beck (1998) also encouraged clinicians to identify predictors of postpartum

depression and to intervene during pregnancy in order to decrease its prevalence and, therefore, its effects on children.

Anxiety Following Pregnancy

Although there is a large body of literature covering postpartum depression, anxiety during this period has received relatively little attention. Anxiety disorders are the most common form of mental illness. Considering that the one-year prevalence rate of generalized anxiety is approximately 3% in the general population (APA, 2000), that childbirth is a time of great change and stress, and the high rate of comorbidity between anxiety and depression, it seems that anxiety should attract the attention of researchers and clinicians alike. Women who reported anxiety during the postpartum period have also reported less confidence in the maternal role (Barnett & Parker, 1986); however, the impact that postpartum-onset anxiety in mothers has on children remains an area in need of investigation (Wenzel, Haugen, Jackson, & Robinson, 2005).

Some studies have looked at correlates of anxiety during the first several postpartum days. Britton (2005) had 422 women complete study measures after delivery, just prior to discharge from the hospital. State anxiety, as measured by the State Trait Anxiety Inventory (STAI), was significantly correlated with a composite score of medical and obstetric risk factors. Associations were also found between state anxiety and prolonged/difficult labor, cesarean section

(compared with vaginal delivery), and inversely with the health of the infant. Using the state form of the STAI both during the last six weeks of pregnancy and again between 24 and 96 hours postpartum, Engle, Scrimshaw, Zambrana, and Dunkel-Schetter (1990) found that Mexican women reported significantly less anxiety after delivery compared to the antepartum period. After controlling for prenatal anxiety, postnatal anxiety in mothers was significantly related to more negative attitudes toward their babies.

In another study of 100 women that included both at-risk and healthy newborns, mothers who had more negative attitudes toward pregnancy and childbirth exhibited higher levels of postpartum anxiety measured by the fifth postpartum day (Blumberg, 1980). This finding remained significant even after controlling for neonatal risk. The measure used to assess attitudes toward pregnancy and childbirth was associated with trait anxiety on the STAI. Levels of state and trait anxiety were also correlated with one another, leaving the author to conclude that attitudes about the maternity process may predict postpartum anxiety (Blumberg, 1980). If this is accurate and levels of postpartum anxiety remain constant or increase, we might expect to find an inverse association between maternal-fetal attachment and postpartum anxiety at six weeks.

Researchers have also looked at the rates of anxiety in women beyond the first postpartum week. Utilizing a prospective design, Heron, O'Connor, Evans, Golding, and Glover (2004) tracked reported levels of anxiety at 18 and 32 weeks

gestation and at eight weeks and eight months postpartum in a community sample of women ($N = 8,323$). Participants completed an eight-item anxiety scale. The stability of anxious symptoms across the four time points was moderate, with closer time points having higher correlations. At eight weeks postpartum, 8.1% of the women scored above the cut-off for elevated symptoms of anxiety. Of these cases, only 2.4% were index (newly-reported) cases; 5.7% endorsed substantial antenatal anxiety as well. When scores from both postpartum time points were considered, 1,111 or 13% of the women endorsed elevated anxiety during at least one of the two time points. Of these 1,111 women, two-thirds experienced elevated levels of anxiety during pregnancy as well. A nearly equal number of women, 1,112, reported elevated levels of anxiety during pregnancy but not during the postpartum period. The majority of women who reported antepartum anxiety, however, also endorsed postpartum anxiety (64%). In addition to predicting anxiety during the two postpartum periods measured, anxiety during pregnancy was also a significant predictor of postpartum depression, even after controlling for antenatal depression. In another study looking at anxiety at 14 weeks postpartum using two self-report measures, including the STAI, the point prevalence was 8.7% among a sample of 107 women (Stuart, Couser, Schilder, O'Hara & Gorman, 1998)

Studies utilizing the "gold-standard" in psychiatric diagnosis, the Structured Clinical Interview for DSM-IV diagnosis (SCID), have also been

conducted. At eight weeks postpartum, the SCID was administered to 68 women

to determine the prevalence of generalized anxiety and major depression (Wenzel,

Haugen, Jackson, & Robinson, 2003). Because the interview took place only two

months after delivery, the time criterion for generalized anxiety was modified

from six months to two months. Based on the structured interviews, three women

(4.4%) met criteria for generalized anxiety, and 19 women (27.9%) reported

symptoms of anxiety that did not meet full diagnostic criteria. Just over half of the

women reporting sub-syndromal anxiety at eight weeks postpartum stated that

they had experienced symptoms of anxiety prior to conception and throughout the

pregnancy.

In another study using the SCID for diagnosis, 147 women were recruited

through mailings and follow-up telephone calls (Wenzel, Haugen, Jackson, &

Brendle, 2005). Information was obtained through telephone interviews and

through self-report measures mailed to women at approximately eight weeks

postpartum. The SCID was administered to all participants. The prevalence rate of

generalized anxiety was 8.2% (12 women), which is nearly double the one-year

prevalence rate in the general population. An even greater number of women

reported sub-threshold symptoms of anxiety, with 29 or 19.7% endorsing sub-

threshold symptoms of general anxiety. About 40% of the women diagnosed with

generalized anxiety reported the presence of symptoms during pregnancy that did

not reach diagnostic criteria until after delivering the baby, indicating a postpartum exacerbation of symptoms.

As with depression, predictors of postpartum anxiety are lacking. Although no studies have investigated whether maternal-fetal attachment may be related to postpartum anxiety, a few studies have found contemporaneous associations between these variables. Using the trait form of the STAI, Cranley (1981b) failed to find a correlation between prenatal attachment using the Maternal Fetal Attachment Scale and anxiety. However, using an unpublished, quantifiable interview eliciting the amount of stress women experienced due to their health, the health of the fetus, and difficulties with pregnancy, she found a significant inverse correlation between the perception of stress and MFAS scores ($r = -.41, p < .01$). Gaffney (1986), using the same measures, found an inverse relationship between maternal-fetal attachment and state anxiety ($r = -.26, p < .01$), but no significant correlation between MFAS scores and trait anxiety. Finally, Condon and Corkindale (1997) found a negative association between MFAS scores and levels of anxiety on two self-report measures in pregnant women during the third trimester. As no study has addressed whether maternal-fetal attachment predicts anxiety during the postpartum period, the current study will look at the relationship between these variables.

The Impact of Hospitalization During High-Risk Pregnancy

High-risk pregnancy, which occurs in approximately one million women in the United States each year, is defined as a pregnancy "in which there is significant possibility of fetal demise, anomaly, or life-threatening illness in the newborn infant. There may be serious health risks for the expectant woman…" (Penticuff, 1982, p. 69). Ambivalence about pregnancy is a normal part of a woman's psychological development over the course of gestation and is typically resolved by the end of the first trimester (Penticuff, 1982). In a high-risk pregnancy, the woman may have difficulty reconciling her love toward the fetus with her fear of fetal demise or anomaly, regardless of gestational age. Her worries may impede her psychological development during the pregnancy:

> Any threat to the expectant woman's sense of adequacy during pregnancy tends to spill over into the next developmental period. Thus, the experience of high-risk pregnancy in which the expectant woman feels that she has performed unsatisfactorily in the task of producing a healthy baby has implications for her sense of adequacy in taking on the role of mother after the infant is born (Penticuff, 1982, pp. 69-70).

A woman with an uncomplicated pregnancy fantasizes about the baby, her role as a mother, and her interactions with the baby. The woman with a high-risk pregnancy may doubt whether she will even be a mother. A high-risk pregnancy

also has implications for the expectant couple, placing enormous challenges on the relationship (Penticuff, 1982).

Approximately 700,000 women are hospitalized annually in the United States during pregnancy due to medical complications of the mother, the fetus, or both (Maloni, Kane, Suen, & Wang, 2002). Hospitalization is an extremely stressful experience for most people; mothers who must be hospitalized due to complications with their pregnancy experience fear about their own health and the health of the fetus. Women who did not plan to become pregnant and those who considered terminating their pregnancy, in particular, may experience increased ambivalence or more negative attitudes toward pregnancy in the context of being hospitalized. Hospitalization also separates a woman from those who provide her with important social support during a time when it becomes more critical; empirical evidence has supported this.

In a study looking at stressors during the course of antepartum hospitalization, 61 women completed a self-report measure of stressors and indicated the degree to which each had an impact on them (White & Ritchie, 1984). The stressors were divided into seven categories: separation, environment, health status, communication with health professionals, self-image, emotions, and family status. Separation from home and family, and feelings of loneliness, depression, and anxiety, were rated as most distressing. The effects of her hospitalization on the functioning of the family, her health concerns, and changes

in her self-image were rated as causing some or very little stress. Communication with health professionals and the hospital environment were rated as least stressful. During a woman's hospitalization, she is unable to work on certain tasks of pregnancy, such as making physical arrangements for the baby's arrival and creating acceptance among those close to her for her baby and herself. The hospital environment may make it more difficult for her to attach to her fetus due to the constant reminder of the increased risk of her pregnancy, her separation from important people in her life, and her inability to prepare the home for the baby.

Although the women were not hospitalized in their study, Kemp and Page (1987) compared women who received a diagnosis of a high-risk pregnancy with women who had no complications. Fifty-four women with no complications were recruited from Lamaze classes, and 32 women with high-risk pregnancies were referred by physicians in a high-risk antepartum clinic. All women were married and in their third trimester of pregnancy. Diagnoses of the high-risk women included one or more of the following conditions: premature labor, placenta previa, diabetes mellitus or gestational diabetes, fetal intrauterine growth retardation, and pregnancy-induced hypertension. Participants reported demographic information and completed self-report measures of perception of current pregnancy, health status during the current and prior pregnancies, feelings toward being a mother, feelings toward the fetus, and self-esteem. No differences

were found between the groups on a measure of thoughts, feelings, and behaviors toward the fetus; however, women with high-risk pregnancies reported lower levels of self-esteem than women with uncomplicated pregnancies. The authors speculated that the women with the high-risk pregnancies may not have actually perceived any threat to their health or the health of their fetuses. It is conceivable that this was the case, although this is highly unlikely in women who must be hospitalized due to complications with pregnancy.

Curry (1987) was the first to investigate maternal-fetal attachment in women hospitalized due to high-risk pregnancy. She conducted a study with 75 women; the mean gestational age at data collection was 29.7 weeks, with a range of 20-37 weeks. Demographic data and information related to risk were obtained during an interview. Self-report questionnaires were used to assess perceived levels of social support, social stress, self-concept, relationship with one's mother, acceptance of pregnancy, identification with the mother role, and maternal-fetal attachment. Further information about thoughts and feelings toward pregnancy and the fetus was acquired through semi-structured interviews.

Compared with data from samples of women with uncomplicated pregnancies, this sample scored lower on pregnancy acceptance and social support, but did not rate themselves differently on the other variables (Curry, 1987). These women described their moods as fluctuating greatly while hospitalized, and all women reported some periods of feeling sad. Women

expressed a great deal of ambivalence about their pregnancy, both wanting it to be over due to the physical discomfort, and being concerned about the baby's health. A minority of women blamed their fetuses for the pregnancy and pregnancy-related problems. Stress was found to have an inverse relationship with measures of acceptance of pregnancy, maternal behavior, and identifying with the mother role. There was a positive correlation between the mother's initial risk score and her identification with the mother role, a finding the author found counterintuitive. She concluded that self-concept played a central role in the reported findings:

> What emerges is a profile of women vulnerable to the effects of a high-risk pregnancy, and perhaps even at risk for developing such a pregnancy. These women probably suffered from inadequate mothering and as a result developed poor self-concepts. Their low self-concepts then very likely influenced their perception of life events, their ability to form social relationships, and their ability to care for themselves. Once pregnant, they may not have had the emotional and/or physical resources to obtain adequate care, which contributed to their obstetrical risk (Curry, 1987, p. 179).

This hypothetical causal chain borrows heavily from attachment theory, including the development of cognitive maps through early child-parent

interactions, the generalization of these patterns of interaction to other important

relationships, and the inter-generational transmission of attachment. Although her

conclusion may be accurate in some cases, she provided insufficient evidence to

support such a theory, which disregards psychosocial variables related to

pregnancy planning and access to health care. Given that more than 30% of

participants had incomes below the national poverty level, this factor alone may

have had more predictive value than self-concept (Curry, 1987). Income had a

higher correlation with the measure of self-concept than any other study variable

($r = .43, p < .01$).

Two subsequent studies utilized data from a larger project comparing

women hospitalized due to high-risk pregnancy with women who had low-risk

pregnancies. Mercer and colleagues (Mercer, Ferketich, May, DeJoseph, & Sollid,

1988) compared 218 low-risk women and 153 hospitalized women between the

24th and 34th weeks of pregnancy. Through self-report questionnaires, they

measured women's perceived level of social support, self-esteem, feelings of

mastery, general health, mate relationship, family functioning, negative life

events, pregnancy risk status, symptoms of anxiety and depression, perceptions of

their relationships with parents as children, teenagers, and at the time of the study,

attitudes toward pregnancy, and maternal-fetal attachment using the MFAS.

Although differences were not found in Maternal Fetal Attachment Scale

scores between low- and high-risk women, low-risk women tended to express

hopeful anticipation and curiosity about their babies, while high-risk women were more likely to report worry and anxiety (Mercer, Ferketich, May, DeJoseph, & Sollid, 1988). No relationship was found in either group of women between MFAS scores and perceived social support, self-esteem, family functioning, negative life events, pregnancy risk scores, anxiety, perception of relationships with participant's mother at any time point or father during childhood and teen years, and readiness for pregnancy. There was a significant correlation between MFAS scores among low-risk women only and the following: current relationship with father, perception of health, sense of mastery, relationship with partner, received social support, size of social network, depression (inverse), age (inverse), and number of children (inverse). There was a significant negative association between high-risk women's MFAS scores and socioeconomic status.

It is curious that more differences were not found between two groups of women who experienced pregnancy in such contrasting manners. Mercer and colleagues (Mercer, Ferketich, May, DeJoseph, & Sollid, 1988) questioned the construct of maternal-fetal attachment as measured by the MFAS, as it had failed to support any theoretical propositions with any consistency. Mercer continued to pursue the study of maternal-fetal attachment in hospitalized pregnant women, using women with uncomplicated pregnancies as a reference group and extending measures to the postpartum period.

Mercer and Ferketich (1994) followed participants during the antenatal period (24th to 34th week of pregnancy) and again during postpartum hospitalization and at 1, 4, and 8 months postpartum. The sample comprised 121 high-risk women (recruited during antepartum hospitalization) and 182 low-risk women (recruited from a general obstetric clinic). Their primary aim was to compare the high- and low-risk women in their assessment of their own parenting abilities. The instruments used in the study described above by Mercer and colleagues (Mercer, Ferketich, May, DeJoseph, & Sollid, 1988) were also used in this study; both studies used data from the same sample of participants. A self-report measure of maternal-infant attachment replaced the MFAS at the four postpartum time points.

Scores of maternal competence did not differ between the two groups at any of the time points assessed (Mercer & Ferketich, 1994). Perceived maternal competence was significantly associated with maternal-infant attachment at each time point for both groups of women. Scores of maternal-fetal attachment predicted a woman's perceived competence in the maternal role among high-risk women during postpartum hospitalization and at one month and eight months postpartum. MFAS scores did not predict perceived maternal competence in the high-risk women at three months postpartum or in the low-risk women at any time point. Self-report measures of depression accounted for 24% of the variance in maternal competence among high-risk women at one month and continued to

have an impact at 8 months, explaining 9.5% of the variance. Among the low-risk women, depression explained 6.4% of the variance in maternal competence at one month postpartum, but did not reach significance at the other time points. State anxiety explained 20.6% and 44.5% of the variance in maternal competence during postpartum hospitalization among high- and low-risk women, respectively. It also explained 30% of the variance in maternal competence among low-risk women at 4 months postpartum. These findings suggest that for high-risk women, the ability to attach to the fetus has implications for her interactions with her baby after birth. This does not appear to be as critical in low-risk women.

It is not surprising that both groups reported state anxiety during postpartum hospitalization given the enormous changes a newborn brings. The finding that the low-risk women's competence was impacted to a larger degree by state anxiety during postpartum hospitalization also seems logical given that the high-risk women had a chance to adapt to the hospital environment and, in many cases, the birth was seen as a relief. For both groups, depressive symptoms decreased a woman's ability to care for her child as she felt she should, and this remained significant for the high-risk women through the eighth postpartum month. Because depression had a detrimental impact on a woman's perceived competence in caring for her child, it likely has negative implications for her ability to bond with her child and to respond to the child's attachment behaviors. Maternal-fetal attachment appeared to serve as a buffer to depression, as it entered

the linear regression equation for high-risk women whenever depression did, but was inversely related to depressive symptoms. Given that obstetric complications have been associated with higher levels of postpartum depression at six weeks (Verdoux, Sutter, Glatigny-Dallay, & Minisini, 2002), the relationship between maternal-fetal attachment and postpartum depression deserves additional attention.

CHAPTER THREE

Methodology

Participants

The sample comprised women who experienced personal and/or fetal risks severe enough to be admitted to the antepartum unit at Baylor University Medical Center. To ensure sufficient time to gather all data for this time point and to not interfere with clinical care, only women whose anticipated hospital stay was at least 72 hours were approached to participate in the study. Women who evidenced psychosis, suicidal ideation, homicidal ideation, or cognitive impairment were excluded from the study. In a few cases a decision was made by the research coordinator to not approach patients if their health or the health of the fetus made it probable that they would not be able to complete the study. For example, one woman was not approached to participate in the study because she had end-stage renal failure and was noncompliant with treatment.

Procedures

Each morning a research investigator obtained a current census for the antepartum unit at Baylor University Medical Center. For new admissions, information was obtained from the nurse responsible for each patient's care regarding the nature of the hospitalization and the anticipated length of stay. Women who were on the unit for antenatal obstetric complications and who were

60

expected to remain on the unit for at least 72 hours were approached by a research investigator who explained the study to the patient and left a consent form for the patient to review. Once consent was obtained, a research investigator asked the participant some demographic questions, introduced the packet of self-report measures (Maternal Antenatal Attachment Scale, Dyadic Adjustment Scale, Center for Epidemiological Studies Depression Scale, Edinburgh Postnatal Depression Scale, and Spielberger State-Trait Anxiety Inventory), and reviewed the participant's medical chart in order to obtain pertinent medical information about the fetus, the pregnancy, and factors that may have placed the participant and/or fetus at risk. Each participant was assigned a number, and all identifying information, including the consent form and contact information, was kept in a separate, locked file cabinet from the data used in the study.

Delivery dates for research participants were obtained through hospital records, weekly obstetric service team meetings, and from the participants themselves. When actual delivery dates were unavailable, the woman's reported expected delivery date was used in timing the postpartum questionnaire mailings. Approximately five weeks after the delivery date, participants were contacted by telephone, thanked for their participation in the study, and asked a few questions regarding the infant and labor. A research investigator verified the participant's mailing address and informed her that a packet of questionnaires (Center for Epidemiological Studies Depression Scale, Edinburgh Postnatal Depression

Scale, and Spielberger State-Trait Anxiety Inventory) would be mailed to her to

fill out and to return in a pre-addressed, stamped envelope. When one or more

items on an instrument were left blank, the scores for the items that were

answered were averaged. This value was used in place of the omitted data in

calculating the total score on a given measure. All statistics were computed using

SPSS 14.0 for Windows.

Measures

  Demographic questionnaire. The demographic questionnaire was used to

obtain the following information: gestational age of the fetus, whether the

pregnancy was planned or unplanned, whether an elective termination of the

pregnancy was considered, and the participant's marital status and living

situation.

  Maternal Antenatal Attachment Scale. A self-report measure of antenatal

attachment, the Maternal Antenatal Attachment Scale (MAAS), was used to

assess the "emotional tie" a mother felt toward her unborn fetus (Condon, 1993).

This instrument contains 19 items that represent two factors and a global

attachment score. The first factor, "quality," measures the valence of the emotions

and thoughts experienced when thinking of the fetus. The second factor,

"intensity," reflects the amount of time a woman spends engaging with her fetus,

whether through thoughts, feelings, or behaviors. All 19 items make up the global

attachment score and are rated on a 5-point Likert-type scale. Internal consistency of the 19 items on the global scale was high (Crohnbach's alpha = .818; Condon, 1993). The global attachment score will be used for analyses in the current study.

Dyadic Adjustment Scale. The Dyadic Adjustment Scale (DAS; Spanier, 1976) is a self-report measure used to assess an individual's adjustment to marriage or to a similar dyadic relationship. The instrument contains 32 items and yields a score in each of four areas—dyadic cohesion, dyadic satisfaction, dyadic consensus, and affectional expression—as well as an overall adjustment score. The total scale score has demonstrated very high internal consistency (Crohnbach's alpha = .915; Graham, Liu, & Jeziorski, 2006). The Dyadic Adjustment Scale is one of the most widely-used instruments for both clinical and research applications (Graham et al., 2006; Spanier, 2001). Criterion-related validity has been demonstrated through the scale's ability to distinguish married from recently-divorced couples, while correlations between the DAS and other relationship scales have demonstrated concurrent validity (Heyman, Sayers, & Bellack, 1994; Spanier, 1976). In this study, only the overall adjustment score will be used. An overall score of 100 will be the cutting score, with those scoring below 100 considered to have poor dyadic adjustment (Spanier, 2001).

The Center for Epidemiological Studies Depression Scale. The Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977), a self-report screening questionnaire designed for use with community samples, comprises 20

items. Respondents are instructed to focus on the past week and to rate each item as descriptive of them rarely or none of the time, some or a little of the time, occasionally or a moderate amount, or most or all of the time. Each item is weighed equally and is scored 0-3. The CES-D is appropriate for use with the study sample, as it places less emphasis on the vegetative symptoms of depression (e.g., insomnia, weight gain/loss, fatigue) that pregnant women and women in the postpartum period often experience regardless of mood. This instrument has yielded high internal consistency results (Cronbach's alpha = .88-.91) when used with a sample of women in the postpartum period (NICHD, 1999). Finally, in a sample of postpartum women who had experienced high-risk pregnancies, the internal consistency of this instrument was quite high (Crohnbach's alpha = .88; Besser, Priel, & Wiznitzer, 2002).

Edinburgh Postnatal Depression Scale. The Edinburgh Postnatal Depression Scale (EPDS), a 10-item self-report measure, was developed in order to screen for depression in women after childbirth (Cox, Holden, & Sagovsky, 1987). This instrument was designed to assess common depressive symptoms while placing less emphasis on physiological symptoms that are often present in the perinatal period. The participant is asked to rate each item on a four-point Likert-type scale based on how they have felt the past seven days. Items carry equal weight and are scored from 0 to 3 points. The instrument has demonstrated

good reliability: a split-half reliability of .88 and Crohnbach's alpha of .87 have

been reported (Cox & Holden, 2003).

Spielberger State-Trait Anxiety Inventory. The Spielberger State-Trait

Anxiety Inventory (STAI) refers to two separate self-report instruments for

measuring both current (state) and general (trait) levels of anxiety (Spielberger,

Gorsuch, Lushene, Vagg, & Jacobs, 1970). The state anxiety scale instructs the

participant to answer questions based on how they feel at the time they fill out the

questionnaire, while the trait form instructs participants to respond based on how

they generally feel. Respondents indicate whether each item is descriptive of them

not at all, somewhat, moderately so, or very much so. This instrument has been

utilized extensively in both clinical practice and in research studies. It has also

been used with obstetric populations (Britton, 2005).

Statistical Analysis Plan – Primary Hypotheses

Hypothesis 1. Women who report an unplanned pregnancy will endorse

lower levels of prenatal attachment, as measured by the Maternal Antenatal

Attachment Scale (MAAS), than women who report that their pregnancy was

planned. Pregnancy planning is a dichotomous variable, dividing the women into

two discrete groups. The dependent variable, total MAAS score, is continuous; an

independent-samples *t* test will be conducted in order to compare the mean

MAAS scores for the two groups. As multiple *t* tests will be performed in this

study, increasing the likelihood of Type I errors, a Bonferroni correction will be applied if appropriate.

Hypothesis 2. Women who report that they considered terminating their pregnancy will report lower levels of prenatal attachment, as measured by the Maternal Antenatal Attachment Scale (MAAS), compared to women who report that they did not consider elective termination. Again, an independent-samples *t* test will be conducted to compare the mean total MAAS scores of women who considered terminating pregnancy with the mean total MAAS scores of women who denied considering terminating pregnancy. A Bonferroni correction will be applied if appropriate.

Hypothesis 3. A woman's reported satisfaction in her primary romantic relationship, as measured by the Dyadic Adjustment Scale (DAS), will be positively associated with prenatal attachment, as measured by the Maternal Antenatal Attachment Scale (MAAS). Since DAS and MAAS scores are both continuous variables, total DAS and MAAS scores will be analyzed using the Pearson correlation coefficient to determine the strength of this relationship. As there is a recommended cutting score to indicate distress in a romantic relationship on the DAS (i.e., <100; Spanier, 2001), a secondary analysis will be conducted comparing the mean total MAAS scores of women scoring below this score with those scoring at or above this cutting score on the DAS using an independent-samples *t* test. A Bonferroni correction will be applied if appropriate.

Statistical Analysis Plan – Secondary/Exploratory Hypotheses

Hypothesis 4. Women who report higher levels of antenatal attachment during the third trimester, as measured by the Maternal Antenatal Attachment Scale (MAAS), will endorse fewer symptoms of depression on self-report measures—the Center for Epidemiological Studies Depression Scale (CES-D) and the Edinburgh Postnatal Depression Scale (EPDS)—at six weeks postpartum. In order to determine whether there is a relationship between prenatal attachment and postpartum depression symptoms, Pearson correlation coefficients will be carried out comparing women on prenatal MAAS scores and scores on each of the two postpartum depression measures. Only women who complete the MAAS during the third trimester of pregnancy will be included in this analysis, as antenatal attachment has been shown to increase with gestational age. Total MAAS scores obtained during the third trimester will be correlated with total CES-D and EPDS scores obtained at six weeks postpartum. A secondary analysis will divide the women into two groups, those who score above and below the median MAAS score in this sample. Independent-samples *t* tests will be carried out comparing the two groups on levels of postpartum depression as measured by total CES-D and EPDS scores. A Bonferroni correction will be conducted. Because women who report higher levels of antepartum depression may report more of these symptoms during the postpartum period, ANCOVAs will be calculated using depressive symptoms during pregnancy as a covariate.

Hypothesis 5. Women who report higher levels of antenatal attachment during the third trimester, as measured by the Maternal Antenatal Attachment Scale (MAAS), will endorse fewer symptoms of anxiety on a self-report measure—the State-Trait Anxiety Inventory (STAI), State and Trait Forms—at six weeks postpartum. The Pearson correlation coefficient will be used to compare the prenatal MAAS score with STAI State and STAI Trait scores at six weeks postpartum. Again, only women who complete the MAAS during the third trimester of pregnancy will be included in this analysis. Women scoring above and below the median MAAS score will be compared using an independent samples *t* test with the Bonferroni approach. An ANCOVA will also be conducted to control for antepartum anxiety levels.

CHAPTER FOUR

Results

Approximately 1,100 patients were admitted to the antepartum unit at

Baylor University Medical Center between October 2005 and December 2006. Of

these patients, nearly 300 were approached and given an explanation of the study.

The most common reasons patients were not contacted were: anticipated

hospitalization less than 72 hours; admitted to the unit for complications not

related to pregnancy; and admitted during the postpartum period. The majority of

women who learned of the study did consent to participate ($n = 166$), and baseline

measures were completed by 129 participants. Due to early delivery/discharge,

fetal demise, or withdrawal of consent, baseline measures were not collected for

37 participants who had provided consent. For obvious reasons, no information

about those women who did not provide consent was available, but it was

observed that many patients who declined to participate appeared to be in greater

physical and/or emotional distress than those who did consent.

Characteristics of the Sample

   Demographic Information. The demographic makeup of the sample is

shown in Table 1. The sample comprised 129 women, ranging in age from 17 to

44 years, with a mean age of 27.6 years ($SD = 6.4$). Compared with the

demographic make-up of Dallas County, the current sample had a higher percentage of African American and Caucasian women and a lower percentage of Hispanic women (U.S. Census Bureau, 2005). Seventy women were Caucasian (54.3% compared with 37.1% for Dallas County), 42 were African American (32.6% compared with 21.0% for Dallas County), 14 were Hispanic (10.9% compared with 36.8% for Dallas County), and 2 were Asian (1.6% compared with 4.7% for Dallas County). Sixty-six participants were married (52.0%), 41 were single (32.3%), 16 were living with a partner (12.6%), and 4 were separated from their husbands or partners (3.1%).

One participant (0.8%) did not attend any high school, while 16 (12.6%) completed some high school. Thirty-one women (24.4%) completed high school or had completed a General Educational Development test, 44 attended some college (34.1%), and 35 had earned an undergraduate or higher degree (27.6%). At the time of hospitalization, 50 women were unemployed (39.7%), 36 were on a leave of absence (28.6%), 8 were employed part-time (6.2%), and 32 were employed full-time (25.4%). Fourteen participants had an annual household income below $12,000 (11.1%), 30 had an income between $12,000 and $25, 999 (23.8%), 25 reported an income of $26,000-$40,999 annually (19.8%), 20 reported an income of $41,000-$65,000 (15.9%), and 37 reported an income over $65,000 a year (29.4%). Sixty-four women reported receiving Medicaid for health

coverage (50.4%), while 61 had private insurance (48.0%), and 2 had no health insurance coverage upon admission (1.6%).

Pregnancy Characteristics. Data is illustrated in Table 2 and was not available for one participant. First pregnancy was reported by 36 women (28.1%), and 92 had been pregnant before (71.9%). Nine participants (7.0%) reported a prior neonatal demise or stillbirth, 41 reported a history of miscarriage (32.3%), and 10 had had an elective termination (7.8%). Fifty-five had a history of obstetric complications (43.3%). Twenty-four women in the sample were in their first trimester at the onset of obstetric complications (19.0%), 45 (35.7%) were in their second trimester, and 57 were in their third trimester (45.2%). Of the 126 women who were asked about pregnancy planning and consideration of an abortion, only 52 (41.3%) women reported a planned pregnancy, while 10 (7.9%) said that they had considered terminating the current pregnancy.

Psychiatric Characteristics. Data on psychiatric characteristics of the sample was available for 125 (96.9%) of the women (Table 3). Fourteen women (11.2%) reported a history of depression, and 10 (8.0%) said that they had a history of an anxiety disorder. One participant (0.8%) endorsed a past diagnosis of Bipolar Disorder; five (4.0%) had a history of comorbid depression and anxiety. Ninety-five participants (76.0%) denied any psychiatric diagnosis. Thirty-five women (28.0%) had taken at least one psychiatric medication at some point; five (4.0%) and 34 (27.2%) women reported a history of psychiatric hospitalization

and counseling, respectively. Thirty-eight women (30.4%) said that one or more family members had been diagnosed with a psychiatric disorder. At the time of antepartum hospitalization, nine patients (7.2%) reported current use of one or more psychiatric medications.

Four screening instruments—two for depression and two for anxiety—were given to research participants (Table 4). On one depression measure, the Edinburgh Postnatal Depression Scale (EPDS), 57 women (44.2%) scored at or above the threshold score of 11. Forty-nine women (44.1%) scored at or above the threshold score of 16 on the Center for Epidemiological Studies Depression Scale (CES-D). Nearly half of the women (48.8%) met the threshold score on one or both depression measures. On the anxiety measures, the State and Trait Forms of the Spielberger State-Trait Anxiety Inventory (STAI), 59 women (46.1%) and 54 women (41.9%) scored at or above the threshold scores of 42 and 41, respectively. Over half of the women (55.0%) scored above the threshold on one or both of these forms. These instruments are designed to be sensitive to symptoms of depression and anxiety and, therefore, have high rates of false positives in detecting actual psychiatric disorders.

Prenatal Attachment. The Maternal Antenatal Attachment Scale (MAAS) was completed by 129 women. Total score was the sum of all 19 items. The mean score on this instrument was 82.12, with a standard deviation of 6.94 (Table 4). Total scores ranged from 62 to 95. Consistent with previous research on prenatal

attachment, there was a significant positive association between gestational age of the fetus and MAAS score, Pearson $r = .184$, $p = .031$ ($n = 104$). The mean for this group of women is higher than the mean MAAS score reported by Condon (1993; $M = 75.7$, $SD = 8.1$) with a group of non-hospitalized pregnant women. This difference may be an artifact of the increased attention paid to a fetus during hospitalization. The distribution of scores on the MAAS is illustrated in Figure 1.

Dyadic Adjustment. The Dyadic Adjustment Scale (DAS) was included in the packet of measures given to all 129 women to complete. On the page preceding this instrument, women were instructed to skip the DAS if they were not in a committed romantic relationship at the time they filled out this measure. Of the 129 participants, 116 (89.9%) completed the Dyadic Adjustment Scale. Twenty-nine women (22.5%) who were classified as "single" (i.e., not married, separated, divorced, or cohabitating) endorsed being in "a committed romantic relationship" by completing the DAS. Twelve of the thirteen women who did not complete the DAS were single; one woman who did not complete the DAS said that she was engaged and cohabitating with her partner. It is not known why she did not complete the DAS, but she could not be included in analyses using DAS scores. The mean DAS score for this sample was 116.71 ($SD = 19.09$), which corresponds quite well to the mean DAS score among married people in the standardization sample, 114.8 (Spanier, 1975).

In looking at the distribution of scores on the Dyadic Adjustment Scale (Figure 2), there was one extreme outlier. This participant had a total score of 11 on the Dyadic Adjustment Scale. This score fell over five standard deviations below the mean for the sample and was nearly three standard deviations below the next lowest score, 65. This participant's score was not only extreme in terms of the current sample, but it is also very low compared to the sample used in the standardization of the test (Spanier, 1975; Spanier, 2001). For married couples, a raw score of 11 corresponds to a *T* score of 20, which is the lowest possible *T* score on this instrument (Spanier, 2001; p. 11). A raw score of 11 is equivalent to a *T* score of 25 for a divorced couple. The participant who had this extreme value on the DAS indicated on her response form that she was in the process of getting divorced. When this participant's score was removed, the mean DAS score for this sample was 117.64 (*SD* = 16.40), and the range was 65-147.

An analysis was conducted to see whether dyadic adjustment was associated with how far along a woman was in her pregnancy when hospitalized. Gestational age at admission and DAS scores were available for 96 participants. Only one of these women was admitted during the first trimester of pregnancy, so mean DAS scores were compared only for women in their second and third trimesters. An independent-samples *t* test was conducted and was not significant, $t(94) = -0.121$, $p = .904$. Women who were admitted to Baylor during the second trimester of pregnancy (*M* = 116.56, *SD* = 19.03) reported similar levels of dyadic

adjustment as those women admitted during the third trimester ($M = 117.06$, $SD = 21.09$).

Overview of Statistical Analyses - Primary Hypotheses

    Hypothesis 1. It was anticipated that women who reported that their current pregnancy was unplanned would report lower levels of attachment to their fetus as measured by the total score on the Maternal Antenatal Attachment Scale (MAAS). After providing written consent to participate in the study, women were asked background questions, including: "Was this pregnancy planned?" Of the 126 participants who answered this question, 74 (58.7%) reported unplanned pregnancies; 52 (41.3%) said that they had planned to become pregnant (Table 5). Prenatal attachment was measured using the global attachment score on the MAAS. An independent-samples *t* test was performed to compare the mean MAAS scores of these groups and was not significant, $t(123.2) = -0.39$, $p = .69$ (Table 5). Women who reported unplanned pregnancies ($M = 82.15$, $SD = 7.54$) endorsed the same level of attachment to their fetus as women with planned pregnancies ($M = 82.62$, $SD = 5.73$). These distributions are illustrated in Figure 3.

    A secondary exploratory analysis was conducted to determine if a trend in the hypothesized direction could be detected. The sample was divided into two groups based on MAAS scores-those who scored at or below the median and

those who scored above the median MAAS score for the whole sample. A chi-square test was conducted to see whether women with high or low MAAS scores were more likely to report planned or unplanned pregnancies. The result of the chi-square test failed to distinguish women's level of prenatal attachment based on pregnancy planning, Pearson χ^2 (1, $n = 126$) = 1.18, $p = .28$ (Table 6). A further analysis was carried out to see whether groups of women who had low (more than one standard deviation below the mean) or high (more than one standard deviation above the mean) MAAS scores differed from one another in terms of pregnancy planning. The chi-square test failed to distinguish these women, Pearson χ^2 (1, $n = 38$) = 1.31, $p = .25$ (Table 7).

Hypothesis 2. Participants who reported that they had considered an elective termination of their current pregnancy were expected to endorse less attachment to their fetus than women who did not consider an abortion. Women were asked: "Did you consider termination?" Only 10 (7.9%) women said that they considered termination, and 116 (92.1%) denied it. Again, prenatal attachment was measured using the MAAS. An independent-samples *t* test comparing the means of these two groups was performed and was not significant, $t(124) = 1.47$, $p = .14$ (Table 8). Women who contemplated an elective abortion ($M = 79.30$, $SD = 8.69$) endorsed approximately the same level of attachment to their fetus as women who denied considering terminating their pregnancy ($M = 82.60$, $SD = 6.63$). Figure 4 shows these distributions.

The sample was again divided into two groups based on MAAS scores. The low group was composed of women scoring at or below the median, and the high group scored above the median. Women with low and high MAAS scores were compared using a chi-square test to see whether one group was more likely to have considered an elective abortion. The results of the test were not significant, Pearson χ^2 (1, $n = 126$) $= 0.43$, $p = .51$ (Table 9). Another analysis was carried out to see whether groups of women who had low (more than one standard deviation below the mean) or high (more than one standard deviation above the mean) MAAS scores differed from one another in terms of having considered an abortion. The result of the chi-square test was not significant, Pearson χ^2 (1, $n = 40$) $= 0.95$, $p = .33$ (Table 10).

Hypothesis 3. A positive association was predicted between a woman's reported satisfaction with her current romantic partner and her reported attachment to her fetus. A correlation coefficient was computed to compare scores on the DAS and on the MAAS. The Pearson correlation coefficient was not significant when data from all 116 participants was used, $r(114) = .12$; $p = .098$ (1-tailed; Table 11). Although this relationship was not statistically significant, there was a positive relationship between the two variables that suggested a trend (Figure 5). A second correlation was calculated excluding the extreme outlier discussed above. The Pearson correlation coefficient found a significant positive

association, $r(113) = .23$; $p < .01$ (1-tailed). This relationship is illustrated in Figure 6.

The association between dyadic adjustment and antenatal attachment was also examined by comparing women who rated their relationship in the distressed (<100) and non-distressed (≥ 100) ranges on the Dyadic Adjustment Scale (Spanier, 2001; Table 12). An independent-samples t test was conducted to test the hypothesis that women who reported distress in their relationship ($n = 19$; 16.5%) would report lower levels of prenatal attachment on the MAAS compared to women who reported less distress ($n = 96$; 83.5%). The t test was significant, $t(113) = -2.37$, $p = .01$ (1-tailed). Women in poorer functioning relationships reported lower levels of prenatal attachment on average ($M = 78.53$; $SD = 7.16$) than women in higher-functioning relationships did ($M = 82.54$; $SD = 6.67$). Distributions for these groups are illustrated in Figure 7. Although this t test was significant, multiple t tests were performed using MAAS scores as the dependent variable. When the Bonferroni correction was used to account for each of the seven comparisons made, this finding became non-significant ($p = .07$), although it still approached significance.

Twelve women reported being single and, therefore, did not complete the DAS. As these women were not included in the above analyses, it seemed appropriate to look at how they compared to the women who did complete the DAS in terms of prenatal attachment scores (Table 13). A one-way analysis of

variance was conducted. The independent variable, relationship status, had three groups: single women who did not complete the DAS ($n = 12$; 9.4%), women who scored under 100 on the DAS ($n = 19$; 15.0%), and women who scored 100 or greater ($n = 96$; 75.6%). Total MAAS score was the dependent variable. Although the differences between the group means did not reach statistical significance, $F(2, 124) = 3.02$, $p = .052$, there was a trend indicating that women who reported not being in a relationship ($M = 83.42$, $SD = 7.56$) and women who reported being in a non-distressed relationship ($M = 82.54$, $SD = 6.67$) endorsed higher levels of prenatal attachment than women in distressed relationships ($M = 78.53$, $SD = 7.16$). Figure 8 shows these distributions.

Further analyses, forward stepwise multiple regressions, were conducted in order to evaluate whether the factors discussed above could better predict MAAS and DAS scores when combined. For these analyses, the entry criterion was set at a p value of .10, while the removal criterion was set at a p value of .15. The first regression analysis was performed in order to determine whether pregnancy planning, consideration of an abortion, and dyadic adjustment could predict MAAS scores better than any one of these variables alone. The only factor that was entered into the model based on the entry criterion was DAS score. Consistent with the Pearson correlation, DAS scores were significantly related to MAAS scores, $R^2 = .042$, adjusted $R^2 = .034$, $F(1, 111) = 4.91$, $p = .029$ (Table 14).

A second analysis looked at whether the combination of pregnancy planning, considering terminating pregnancy, and MAAS scores could better predict DAS scores than each individual factor. Based on the criteria for the regressions, two models emerged, which were both significant. The regression equation that included considering termination and MAAS scores was significant, $R^2 = .076$, adjusted $R^2 = .059$, $F(2, 110) = 4.50$, $p = .013$, as was the regression equation that only incorporated considering termination, $R^2 = .047$, adjusted $R^2 = .039$, $F(1, 111) = 5.50$, $p = .021$ (Table 15). Based on these results, it appears that more of the variance in DAS scores is attributable to whether a woman considered termination than to her score on the MAAS. It seems that women who considered terminating their pregnancy reported less satisfaction with their primary romantic relationships.

Binomial logistic regression analyses were performed to look further at predictors of prenatal attachment and dyadic adjustment. The entry criterion for these analyses was set at .05, and the removal criterion was set at .10. A regression was performed comparing women who scored at or below the median and above the median on the MAAS. Predictor variables for the MAAS included pregnancy planning, considering termination, DAS score, and household income. Household income was entered as a nominal variable with the following ranges: $0-$25,999, $26,000-$65,000, and over $65,000. The only variable that entered the equation was DAS score, indicating that women who reported higher levels of

dyadic satisfaction were slightly more likely to report high levels of prenatal attachment, (OR = 1.026, 95% CI = 1.001-1.051; Table 16). Women who scored more than one standard deviation below and above the mean were compared using the same predictor variables. None of the criteria was significant in the model predicting extreme scores on the MAAS.

A further analysis was conducted to see whether MAAS score, pregnancy planning, considering termination, and household income could predict relationship distress as measured by DAS scores. The model included both considering termination and household income. It appears that women who did not consider termination were less likely to be in a distressed relationship (OR = 0.14, 95% CI = 0.021-0.924), while women with higher household incomes were twice as likely to report being in non-distressed relationships (OR = 2.08, 95% CI = 1.023-4.209; Table 17). When women who scored more than one standard deviation below and above the mean on the DAS were compared, household income and MAAS scores were significant. Women who reported higher prenatal attachment were more likely to have DAS scores in the non-distressed range (OR = 1.16, 95% CI = 1.007-1.330), while women with higher household incomes were more than three times as likely to report non-distressed relationships (OR = 3.64, 95% CI = 1.198-11.071; Table 18).

Because household income proved to be a predictor of dyadic adjustment, and dyadic adjustment has been associated with prenatal attachment, ANOVAs

were run to compare women on DAS and MAAS scores across income levels. Again, three income ranges were used: $0-$25,999, $26,000-$65,000, and over $65,000. A one-way analysis of variance was carried out to compare women with different income levels on DAS scores. The ANOVA was significant, $F(2, 110) = 3.19$, $p = .045$ (Table 19). Post hoc pairwise comparisons were made using the Tukey HSD test. The difference in DAS scores was significant between women earning less that $26,000 ($M = 113.26$, $SD = 17.91$) and those earning more that $65,000 ($M = 122.70$, $SD = 13.64$; $p = .039$). Women who earned between $26,000 and $65,000 did not have DAS scores that were statistically distinct from women with lower or higher annual household incomes.

Another one-way analysis of variance was conducted to determine whether women with different income levels report different levels of prenatal attachment. The ANOVA was not significant, $F(2, 122) = 0.38$, $p = .685$. Women who had incomes of less than $26,000 reported levels of prenatal attachment ($M = 81.75$, $SD = 7.56$) similar to women with incomes between $26,000 and $65,000 ($M = 82.69$, $SD = 7.12$) and to women with incomes greater than $65,000 ($M = 83.00$, $SD = 5.15$; Table 20).

Overview of Statistical Analyses – Secondary/Exploratory Hypotheses

Most women who participated in the study were discharged prior to delivery and, in many cases, did not return to Baylor to deliver. As one can

imagine, this made follow-up with these women quite challenging. However, every attempt was made to collect follow-up data. Mailings of postpartum measures were sent out approximately five weeks after the delivery date, when it was known. When the actual delivery date was not available, postpartum measures were mailed based on the anticipated delivery date. In many instances, women delivered considerably earlier than their due date and, therefore, received the postpartum measures too late to be included in the current analyses. A total of 93 postpartum questionnaires were mailed; only 27 (29.0%) were returned completed. Of the postpartum mailings that were returned, 14 were completed between 4 and 10 weeks postpartum and comprised the sample for the following analyses (Table 21).

Comparisons were made between the 115 women who did not have valid postpartum data and the 14 women who did. Chi square tests were run to compare categorical variables, and independent-samples t tests were run to compare the groups on continuous variables. Only one difference was found between the two groups: women who did not have valid postpartum data endorsed more symptoms of depression during antepartum hospitalization on the CES-D ($n = 98$; $M = 16.77$, $SD = 10.15$) than women who did complete the postpartum measures ($n = 13$; $M = 9.85$, $SD = 7.48$), $t(109) = 2.37$, $p = .02$ (Table 22). Of the 14 women who were included in the postpartum analyses, three women (21.4%) had reported a history of an anxiety disorder at baseline, and one woman had reported a history

of depression (7.1%), compared with 10 (8%) and 14 (11.2%) of the 115 women who did not complete postpartum measures and endorsed a history of anxiety and depression.

It was proposed that women who completed the depression and anxiety measures at six weeks postpartum would be included in these analyses if their baseline measures were completed during the third trimester of pregnancy. As noted above, 14 women returned valid postpartum measures. Seven of these women had been hospitalized prior to the third trimester (i.e., the 28th week), but during or after the 23rd week of pregnancy. Because half of the valid postpartum response sets were completed by women hospitalized between the 23rd and 28th weeks of pregnancy, the third trimester criterion was expanded to include women hospitalized as early as 23 weeks. A previous study examining the onset of quickening in 100 primigravidae (pregnant for the first time) and in 100 multigravidae (had prior pregnancy) found that all women experienced fetal movement by the 22nd week of gestation (O'Dowd & O'Dowd, 1985). Using the 23rd week as a cutoff rather than the 28th week appears appropriate insofar as quickening increases maternal-fetal attachment, and all of these women should have experienced fetal movement by the time of hospitalization.

Hypothesis 4. It was hypothesized that women who reported higher levels of attachment to their fetus on the Maternal Antenatal Attachment Scale (MAAS) would endorse fewer symptoms of depression on the Center for Epidemiological

Studies Depression Scale (CES-D) and on the Edinburgh Postnatal Depression

Scale (EPDS) during the postpartum period (4-10 weeks). The MAAS was

completed as early as the 23rd week and as late as the 37th week of pregnancy by

the 14 women in this subset (M = 29 weeks, SD = 4.3 weeks). Pearson correlation

coefficients were calculated and were not significant, r(14) = .31, p = .29 (MAAS

and CES-D) and r(14) = .27, p = .35 (MAAS and EPDS; Table 23). Although

these correlations did not reach significance, the small sample sizes are likely

responsible for this, at least in part, as the values of the coefficients indicate a

small to medium level of association.

Participants were also divided into two groups based on their total MAAS

scores, those scoring below (n = 6) and at or above (n = 8) the median for this

subset of participants. An independent-samples t test was conducted comparing

these two groups on postpartum CES-D scores and was not significant, t(12) =

-0.75, p = .47 (Table 24). The two groups were also compared based on

postpartum EPDS scores, and the test was not significant, t(12) = -0.65, p = .53

(Table 25). These distributions are illustrated in Figures 9 and 10.

Women who experienced depressive symptoms during pregnancy may

have been more likely to experience depression during the postpartum period. In

order to control for this potentially confounding variable, a one-way analysis of

covariance was computed, where the independent variable was low or high

MAAS score. The dependent variable was postpartum CES-D score, and the

covariate was antepartum CES-D score. An analysis of the homogeneity-of-slopes assumption indicated that the relationship between antepartum and postpartum CES-D scores did not differ significantly based on MAAS scores, $F(1, 9) = 0.11$, $MSE = 306.35$, $p = .75$, partial $\eta^2 = .01$. The ANCOVA was not significant, $F(1, 10) = 0.99$, $MSE = 279.06$, $p = .34$ (Table 26).

An ANCOVA was performed using postpartum EPDS scores as the dependent variable, MAAS group (low or high) as the independent variable, and antenatal EPDS scores as the covariate. An analysis of the homogeneity-of-slopes assumption indicated that the relationship between antepartum and postpartum EPDS scores did not differ significantly due to differences in MAAS scores, $F(1, 10) = 0.65$, $MSE = 37.90$, $p = .44$, partial $\eta^2 = .06$. The ANCOVA was not significant, $F(1, 11) = 0.94$, $MSE = 36.71$, $p = .35$ (Table 27).

The 14 women were divided into two groups, those who scored below ($n =6$) and at or above ($n = 8$) the median MAAS score. These two groups were compared to see whether women low or high in antenatal attachment were more likely to meet the threshold on either depression screening instrument, the EPDS or the CES-D. The result of the chi-square test failed to distinguish women's level of prenatal attachment based on postpartum depressive symptoms, Pearson χ^2 (1, $n = 14) = 0.73$, $p = .39$ (Table 28).

Hypothesis 5. Women who reported higher levels of maternal-fetal attachment during the third trimester of pregnancy were expected to have lower

levels of anxiety at six weeks postpartum, as measured by the State Trait Anxiety Inventory (STAI). These analyses looked at women who completed the STAI between 4 and 10 weeks postpartum and who completed the Maternal Antenatal Attachment Scale (MAAS) after the 23rd week of gestation. STAI and MAAS scores were compared; Pearson correlation coefficients were calculated (Table 23) and were not significant, $r(14) = .11$, $p = .70$ (MAAS and STAI State) and $r(13) = -.03$, $p = .93$ (MAAS and STAI Trait).

Again, women were also divided into two groups based on their total MAAS scores, those scoring below ($n = 6$) and at or above ($n = 8$ State; $n = 7$ Trait) the median MAAS score for these 14 women (Figures 11 and 12). The mean STAI State and Trait scores appear in Tables 29 and 30, respectively. An independent-samples t test was conducted comparing the two groups on postpartum STAI State scores and was not significant, $t(12) = .00$, $p = 1.00$ (Figure 11). The two groups were also compared based on postpartum STAI Trait scores, and the test was not significant, $t(11) = .42$, $p = .68$ (Figure 12).

As women who are anxious during the antepartum period may be more likely to experience anxiety during the postpartum period, analyses of covariance (ANCOVA) were conducted using MAAS score category (low or high) as the dependent variable, postpartum STAI scores as the dependent variable, and antepartum STAI scores as the covariate. Analyses were conducted for both the State and Trait Forms of the STAI. First, the homogeneity-of-slopes assumption

was tested for the state form and was significant, indicating that the relationship between antepartum and postpartum STAI scores may be related to differences in MAAS group, $F(1, 10) = 6.88$, $MSE = 97.96$, $p = .03$, partial $\eta^2 = .41$. Because the interaction between the grouping variable, low or high MAAS score, and the covariate, antepartum state anxiety, was significant, an ANCOVA was not an appropriate test. In order to determine whether the difference in state anxiety during pregnancy differed between women low ($n = 6$; $M = 36.00$, $SD = 12.81$) and high ($n = 8$; $M = 31.75$, $SD = 9.22$) in maternal-fetal attachment, an independent-samples t test was conducted and was not significant, $t(12) = 0.73$, $p = .48$ (Table 31).

The homogeneity-of-slopes assumption was tested for the trait form of the STAI to see whether postpartum STAI scores differed in relation to antepartum STAI scores as a function of MAAS grouping; the test was not significant, $F(1, 9) = 0.16$, $MSE = 174.66$, $p = .70$, partial $\eta^2 = .02$. An ANCOVA was conducted and was not significant, $F(1, 10) = 0.30$, $MSE = 159.93$, $p = .60$ (Table 32).

The 14 women were divided into two groups based on total MAAS scores, those who scored below ($n = 6$) and at or above ($n = 8$) the median for this subset ($n = 14$). These women were compared to see whether those low or high in antenatal attachment were more likely to meet the threshold on either anxiety screening instrument, the STAI-State or the STAI-Trait. The result of the chi-

square test failed to distinguish women's level of prenatal attachment based on

postpartum anxiety symptoms, Pearson χ^2 (1, $n = 14$) = 0.12, $p = .73$ (Table 33).

CHAPTER FIVE

Discussion and Conclusions

Introduction

The purpose of this study was to ascertain whether pregnancy planning, consideration of an elective abortion, and the quality of a primary romantic relationship impact a woman's ability to bond with her fetus in the context of hospitalization during pregnancy. Each year, a substantial number of women are hospitalized during pregnancy in the United States. The hospital, doctors, nurses, and daily fetal monitoring likely signal risk to these women. Such concerns about well-being and survival of both mother and fetus could negatively impact the development of a bond between the mother and unborn child. In addition to the stress of hospitalization, women who have unplanned pregnancies may have a greater likelihood of feeling ambivalent about their pregnancy. Those who considered terminating their pregnancy may experience negative feelings toward the fetus when hospitalization becomes necessary. And women who feel strain in their primary romantic relationship may be unable to invest sufficient energy into an evolving relationship with a child. A failure to connect with the fetus and to prepare psychologically for the arrival of an infant may interfere with a woman's ability to provide sensitive care to a newborn. Secondary exploratory hypotheses

predicted that maternal-fetal attachment may serve as a moderating factor in the development of postpartum symptoms of depression and anxiety.

Characteristics of the Sample

The majority of women who were approached to take part in the current study consented. Women ranged in age from 17 to 44 years ($M = 27.6$; $SD = 6.4$). The participants were quite diverse in terms of ethnicity, marital status, level of education, and income. Nearly half of the participants in this study were ethnic minorities (i.e., not Caucasian), and only half were married. Annual household incomes were varied. Although 37 (29.4%) women reported a household income greater than $65,000 annually, 64 women (50.4%) qualified for Medicaid health coverage. The diverse demographic composition of the current sample is a strength of this study, as ethnic minorities and unmarried, low-income women have been linked to both higher rates of unintended pregnancy and to higher rates of abortion and have been under-represented in previous research in the area of maternal-fetal attachment. The substantial number of unmarried women mirrors the population at large, providing a range of relationship situations in which to measure dyadic adjustment (e.g., cohabitating, but not married). In their analysis of pregnancies in 2001, Finer and Henshaw (2006) found that just over half (54.6%) of pregnant women were married, while about one-third (35.3%) of unmarried pregnant women were cohabitating.

More than half of the women in the study ($n = 74$, 58.7%) reported that they had not planned to become pregnant. Ten women (7.8%) had a history of elective abortion, and ten had considered termination of their current pregnancy. Information on history of or consideration of elective abortions has not been reported in previous studies on prenatal attachment. Only one woman who reported a prior abortion stated that she considered terminating the current pregnancy. The women in this study were rather diverse in terms of number of prior pregnancies and gestational age at the onset of complications. Many women had experienced complications with previous pregnancies. Much of the prior research has focused on women pregnant for the first time or on women in a particular trimester of pregnancy. Few studies have examined factors associated with prenatal attachment in women hospitalized during the antepartum period. To date, no study has examined whether a woman's consideration of an abortion impacts maternal-fetal attachment.

Surprisingly few women endorsed a history of a psychiatric disorder, although nearly one-third reported a family history of psychiatric illness. Women with active psychiatric conditions may have been less willing or less able to participate in the study. It was observed that many women who chose not to participate in the study appeared rather despondent when approached. Consequently, women who struggled with depression during hospitalization may be under-represented in the current sample. It should be noted, however, that

estimates of the point prevalence of major depression during the antepartum period have been lower than for women in the general population (Gaynes, Gavin, Meltzer-Brody, Lohr, Swinson, Gartlehner, Brody, & Miller, 2005; American Psychiatric Association, 2000).

The Maternal Antenatal Attachment Scale (MAAS) was used to quantify the level of maternal-fetal attachment, which was reported by 129 participants. Condon (1993), who wrote this instrument, published a mean total score of 75.7 in a group of 112 non-hospitalized pregnant women. The mean score of 82.1 in the current sample is nearly one standard deviation higher than in Condon's sample. This difference may be due to the increased focus on the fetus and on the pregnancy due to hospitalization. For example, the frequency of thoughts about the fetus, the desire to obtain more information about the fetus, and thoughts about what will happen to the fetus are all likely to be higher among a group of hospitalized women. Cultural factors may also contribute to this difference: Condon's sample was composed of Australian women, while the participants in this study were primarily from Texas. All women in the current study completed the MAAS during hospitalization.

The Dyadic Adjustment Scale (DAS) was completed by 116 women and was used to measure the overall quality of or level of functioning in a current romantic relationship. The mean score for the current sample was comparable to the mean score for married couples in the standardization sample. Based on the

scores for the current sample, it appears that high-risk pregnancy alone does not place substantial strain on the functioning of a relationship. The effect of prolonged hospitalization on relationship functioning would be of interest, but is beyond the scope of the current study. It was noted that there was one extreme outlier on this instrument in the current sample. No irregularities were found in this participant's response set; however, she did indicate that she was going through a divorce. Because her score fell more than five standard deviations below the mean for this sample, her score was excluded from all but one analyses using the DAS.

Summary and Discussion of Findings

Pregnancy Planning. Pregnancy planning appeared to have no significant impact on maternal-fetal attachment in this sample of women hospitalized during the antepartum period. Both parametric and nonparametric tests were utilized, but they failed to reach statistical significance. Two prior studies have looked at the relationship between prenatal attachment and attitudes toward pregnancy. Condon and Corkindale (1997) reported an association between the degree of pregnancy planning and total MAAS score in a non-hospitalized population; however, Mercer, Ferketich, May, DeJoseph, and Sollid (1988) found no relationship between readiness for pregnancy and maternal-fetal attachment in either hospitalized or non-hospitalized women. These studies used different instruments

to measure maternal-fetal attachment. One study looked at "readiness" for pregnancy, while the other looked at degree of planning. The current study, which asked only whether the pregnancy was planned or not, supports the finding that maternal-fetal attachment is not impacted by pregnancy planning in a group of hospitalized, high-risk pregnant women.

Nearly sixty percent of women in the current sample reported that they had not "planned" their pregnancy. This is somewhat higher than the forty-nine percent prevalence of "unintended" pregnancies found in a representative U.S. sample (Finer & Henshaw, 2006). In the latter sample, women who were ambivalent about being pregnant were considered to have had an "intended" pregnancy; however, it seems that the majority of women who were ambivalent about the timing of their pregnancy were unlikely to have planned it. These pregnancies would probably have been classified as "unplanned" in the current study. Researchers looking at attitudes toward pregnancy have used different criteria, including pregnancy intention, pregnancy planning, readiness for pregnancy, and feelings about being pregnant or about having a baby. These similar, yet discrete, questions have made comparisons of women's thoughts about pregnancy quite challenging across research studies.

The demographic composition of the participants in this sample is consistent with a higher proportion of unplanned pregnancies than in the general U.S. population, as ethnic minorities, low-income women, and unmarried

women—characteristics associated with higher rates of unintended pregnancies—were overrepresented in this sample relative to the U.S. population (Finer & Henshaw, 2006). Within the current sample, African American and Hispanic women had higher percentages of unplanned pregnancies (75.6% and 64.3%, respectively) compared to Caucasian women (48.5%). In this sample, pregnancy planning increased with income. Women with annual household incomes of less than $26,000 ($n$ =44; 34.9%) had a 25% rate of pregnancy planning, while women with incomes from $26,000 to $66,000 ($n$ = 45; 35.7%) and over $66,000 ($n$ = 37; 29.4%) endorsed pregnancy planning at 31% and 75%, respectively. Seventy-eight percent of unmarried women in the study reported unplanned pregnancies, while only forty percent of married women did. Of the twelve women who were not in a committed relationship, none had planned to become pregnant.

The greater frequency of unplanned pregnancies in the current sample may also reflect a group of women who did not plan to become pregnant, but who did not feel that the pregnancy occurred at an inopportune time. Many women who did not plan to become pregnant at a particular time are nonetheless happy upon learning that they are pregnant. Some women may be willing to admit that a pregnancy was not planned, but may be less comfortable reporting that they did not want to become pregnant, particularly to people involved in their antenatal care. They may fear that reporting an "unintended" pregnancy might convey a

negative attitude toward their current pregnancy, while reporting an "unplanned" pregnancy may not have such a negative connotation.

Another factor to consider is that approximately twenty percent of all pregnancies in the United States are aborted voluntarily (Finer & Henshaw, 2006). Presumably, the vast majority of these pregnancies were unintended or unplanned. Taking this into consideration, the rate of unplanned pregnancies in the current sample (58.7%) is even more discrepant with the 49% of unintended pregnancies in the U.S. population, as women with unplanned pregnancies that were aborted were not present in this sample. It appears that unplanned pregnancies were substantially more prevalent in the current sample compared to the U.S. population.

Whether the high prevalence of unplanned pregnancies in the current sample is related to the high-risk status of these women is unknown. In a study looking at women with normal and high-risk (outpatient) pregnancies, Kemp and Page (1987) found that seventy percent of the normal pregnancies were planned, while only forty-seven percent of the high-risk pregnancies were planned. Although planning does not appear to have a significant impact on maternal-fetal attachment, it may be related to pregnancy risk. Women who are not planning to become pregnant may be more likely to engage in behaviors that increase their risk for obstetric complications, such as smoking or drinking.

It appears that women do not develop a bond with their fetus as a function of whether the pregnancy was planned or not. Rather, it seems that women's thoughts, feelings, and behaviors change as a result of being pregnant. This finding reinforces the observations by Rubin (1975) and Leifer (1977) that pregnancy is a distinct state during which time a woman's energy is turned toward a set of maternal tasks. One of these tasks is to form a bond with the fetus, and the other tasks ultimately support this bond, whether through preparing a space for the baby to sleep or by negotiating important relationships so that the baby is accepted by others. Just as attachment behaviors are present in infants at birth, maternal behaviors during pregnancy are likely activated by biological changes and mark the beginning of the caregiving behavioral system. Once this caregiving system is activated, a woman's energies are directed toward having a child, and whether she made a conscious decision to become pregnant may become inconsequential.

Notwithstanding a potential innate caregiving response in women who are pregnant, the fact that all of the women in the current sample were hospitalized cannot be overlooked in terms of the possible effect this may have had on levels of prenatal attachment. As stated earlier, the women in the current sample had somewhat higher MAAS scores than the low-risk women in Condon's sample. This difference in mean MAAS scores between these groups may be a function of the high-risk, hospitalized status of the current sample. Certainly, on average,

women who are hospitalized spend more time thinking about and obtaining information regarding their fetus; items measuring both of these are on the MAAS. Hospitalized women are also more likely aware of the degree to which her fetus depends on her for survival. With regular fetal monitoring, hospitalized women are also likely to report a clearer mental picture of the fetus. All of these factors may contribute to a higher score among hospitalized women on the MAAS.

Although it is quite possible that mothers may attach to their fetus in response to the stress of hospitalization itself—developing a stronger bond with the fetus when she risks losing her child—previous studies comparing high- and low-risk women in maternal-fetal attachment have failed to find such a difference. Kemp and Page (1987) found no difference among low- and high-risk outpatient women in Maternal Fetal Attachment Scale (MFAS) scores. In another study using the MFAS, high-risk hospitalized women were compared to low-risk women, and no difference was found in prenatal attachment (Mercer, Ferketich, May, DeJoseph, & Sollid, 1988). Although hospitalization may increase the frequency or intensity of a woman's thoughts about her fetus, it does not appear to be the critical factor in stimulating the creation of the maternal-fetal bond. This relationship develops regardless of whether a woman planned to become pregnant, assuming she does not elect to terminate the pregnancy.

Consideration of Terminating Pregnancy. Women who considered terminating their pregnancy and women who did not consider an abortion have similar levels of maternal-fetal attachment during antepartum hospitalization. Ten women (7.9%) endorsed considering termination of their current pregnancy. These women were compared to the other participants (*n* = 116; 92.1%) using both parametric and nonparametric techniques, and no statistically significant differences were found in levels of prenatal attachment. It is possible that the difference in means for the two groups would have reached significance had the group of women who considered termination been larger (considered termination: *M* = 79.30, *SD* = 8.69; did not consider termination: *M* = 82.60, *SD* = 6.63).

To date, no other study has looked at whether women who thought of terminating pregnancy report lower or higher levels of prenatal attachment, so comparisons between the current sample and groups of healthy or hospitalized pregnant women were not possible. Finer and Henshaw (2006) found that slightly more than twenty percent of pregnancies were aborted in the United States in 2001. The study did not report how many women considered termination and ultimately decided against it. Obviously, women who elected to have an abortion were not found in the current sample. If approximately twenty percent of pregnancies are aborted, it is conceivable that only eight percent of the women in this sample considered an abortion. Given the high rate of unplanned pregnancies in this diverse sample, however, it is surprising that more women did not consider

terminating their pregnancy. Another possibility is that because the abortion rate is relatively high among ethnic minorities and unmarried, lower-income women, there may have been fewer women in the sample who considered an abortion but who ultimately did not have the procedure.

Because so few women in the current study reported that they considered an abortion, meaningful comparisons of demographic variables were not possible between these ten women and the rest of the sample. Women in the current study may have felt uncomfortable admitting to a member of the hospital staff—those working to save the pregnancy—that they had thought of terminating their pregnancy. Although religious preference was not explored in the current study, Baylor University Medical Center was formerly affiliated with Baylor University, a Baptist university. Due to its historical Protestant affiliation, Baylor University Medical Center may attract fewer women who consider abortion an option for religious or moral reasons. Women who considered termination may have had more negative attitudes toward their pregnancy and/or fetus and, consequently, may have been less likely to take part in the study. Although approximately half of the Caucasian women in this study reported an unplanned pregnancy, only one Caucasian woman reported that she had considered termination. It seems likely that this variable was underreported.

In the current sample, no significant relationship existed between prenatal attachment and whether a woman considered terminating her pregnancy.

Consistent with the current finding regarding pregnancy planning, consideration of an abortion does not seem to hinder the formation of a bond between mother and fetus. The same biological factors are present in these women as with any pregnant woman. The natural changes that accompany pregnancy include activation of the caregiving behavioral system. Even if a woman had wanted to end her pregnancy, the fact that she is hospitalized means that she is fighting to keep her baby. "The high-risk woman who is hospitalized either in her local hospital or in a medical center in another city is highly committed to her fetus" (R. T. Mercer, quoted in Kennell & Klaus, 1982, p. 19). Once the decision to continue the pregnancy is made, the hospitalized pregnant woman thinks, feels, and behaves like any other hospitalized pregnant woman. As discussed above, she may focus more on her pregnancy while hospitalized. Women in the current study who considered elective termination had mean MAAS scores that were slightly higher than those in Condon's low-risk sample (79.3 vs. 75.7, 1993).

Dyadic Adjustment. This is the first study to demonstrate that in hospitalized pregnant women, a higher-functioning primary romantic relationship is associated with higher maternal-fetal attachment. There was a significant positive association between scores on the DAS and on the MAAS. When women were divided into distressed and non-distressed relationship groups based on the recommended cutoff score on the DAS, women in non-distressed relationships had higher scores on the MAAS on average. Women who were not in a romantic

relationship tended to report levels of antenatal attachment comparable to women who reported being in a non-distressed relationship. This latter finding was a trend and failed to reach statistical significance, possibly due to few participants in the current sample who were not in a committed romantic relationship. The current study builds upon prior research linking a woman's feelings about her relationship with her partner to the strength of the bond she has with her fetus (Condon & Corkindale, 1997; Wayland & Tate, 1993; Wilson, White, Cobb, Curry, Greene, & Popovich, 2000; Zachariah, 2004).

Only one previous study has looked at this relationship in high-risk hospitalized women (Mercer, Ferketich, May, DeJoseph, & Sollid, 1988). That study used a measure of marital adjustment and the Maternal Fetal Attachment Scale and failed to find an association between these variables. The current study used different instruments to measure both the quality of relationship with a partner and prenatal attachment. The tools used in the current study, the DAS and the MAAS, were used in Condon and Corkindale's study (1997), where a positive association was found between these scores in a group of healthy pregnant women. The data from the current sample extend this finding to a group of women hospitalized due to high-risk pregnancy.

Although the current study had a smaller sample size ($n = 129$) than the study by Mercer and colleagues ($N = 153$), the current sample was more diverse (Mercer, Ferketich, May, DeJoseph, & Sollid, 1988). In the prior study,

participants had to either be married or cohabitating, while more than one-third of the current sample did not meet these criteria and would have been excluded from that study. Another difference was that 75% of the women in the prior study were Caucasian, while only 54% of the participants in the current sample were Caucasian. Finally, women's partners were invited to participate in the prior study, so women's responses on the marital adjustment scale may have been influenced by their presence and participation.

Consistent with this study's hypothesis, women in more positive relationships tended to have higher prenatal attachment than women in distressed relationships. An unexpected finding was that women who are not in any romantic relationship have higher levels of maternal-fetal attachment than women in distressed relationships. Although this finding did not reach statistical significance, it has been reported elsewhere that single people tend to have better mental health and to report better personal well-being compared to people in low-quality relationships (McCabe, Cummins, & Romeo, 1996). Personal well-being, enhanced or diminished based on the support of a partner, facilitates the development of maternal-fetal attachment. Another noteworthy finding is that women who reported being in distressed relationships were more likely to have considered terminating their current pregnancy. This finding underscores the importance of social support during pregnancy. No differences were found in DAS scores between women with planned and unplanned pregnancies.

John Bowlby observed that when a woman feels loved by her partner, she has an increased capacity to love a child (1980). In our current society, where families are often geographically separated, the importance of the primary relationship takes on even greater significance. Zachariah (1994b) found that among married women, social support outside of a woman's relationship with her husband and with her mother while pregnant has little impact on a woman's psychological well-being. If single women attach to their fetus better than women in distressed relationships, this is likely due to two factors. First, the woman is not expending energy trying to maintain a problematic attachment (i.e., in a distressed romantic relationship). In addition, she is likely receiving considerable social support. The single woman may have family and friends to rely on for support during pregnancy, and it appears that this support can facilitate the maternal-fetal bond as much as a positive mate relationship.

Only twelve women (9.4%) reported not being in a committed relationship, and four (3.1%) reported being separated. Although single women do not have to expend energy negotiating a romantic relationship, the vast majority of women in the current study were married ($n = 66$; 52.0%), cohabitating ($n = 16$; 12.6%), or single but in a committed romantic relationship ($n = 29$; 22.8%). The current sample suggests that even women who are not married or cohabitating still consider their romantic relationship to be a significant source of support. This highlights the importance of considering all

relationships, not just traditionally-defined ones. Although household income was found to be related to dyadic adjustment, it did not appear to affect the maternal-fetal bond.

   Postpartum Depression and Anxiety. As anticipated, the number of measures completed and returned during the postpartum period was disappointing. Data from only fourteen women (10.9%) was available for these exploratory hypotheses. Multiple parametric and nonparametric tests were utilized to identify a relationship between prenatal attachment and postpartum symptoms of depression and anxiety. Pearson correlation coefficients did not reach statistical significance for comparisons between MAAS scores and any of the depression or anxiety screening measures. When women's mean scores on the depression and anxiety screening measures were compared between participants with high and low MAAS scores, no statistically significant differences were found. When antepartum symptoms of depression and anxiety were controlled for, there were also no statistically significant findings. Nonparametric tests were used to see whether women who were high or low in prenatal attachment would be more or less likely to meet the threshold score on the depression and anxiety screening instruments during the postpartum period. None of these tests was significant.

   Lack of power due to a small sample size for the postpartum measures was anticipated at the outset of this research project, so the current study aimed to identify trends that might provide evidence to guide future investigation.

Although none of the Pearson correlation coefficients was statistically significant, the strength of the correlations between MAAS scores and postpartum depression scores was in the medium range (.27 for EPDS and .31 for CES-D). These values indicate that there may be a relationship between prenatal attachment and postpartum depression symptoms and that the lack of statistical significance was, perhaps, due to the small number of postpartum responses that were available for analysis.

The direction of the association between MAAS scores and postpartum depression ran counter to the hypothesized direction. It was anticipated that high levels of prenatal attachment might mitigate postpartum depression symptoms. Although this cannot be ruled out based on the small sample, the responses received were contrary to the hypothesis. It is possible that women who had higher prenatal attachment were more invested in their fetus and were subsequently more invested in their infants. Perhaps this commitment was reflected in their participation in the study at 4-10 weeks postpartum, despite experiencing more symptoms of depression. Three of the four women who met the threshold on one or both postpartum depression screening instruments had reported high levels of prenatal attachment. This finding, while not statistically significant, supports the medium correlations found between MAAS scores and postpartum EPDS and CES-D scores.

It was also anticipated that high prenatal attachment would be associated with lower levels of postpartum anxiety as measured by the State and Trait Forms of the STAI. Mean scores on the State Form were identical for women low and high in prenatal attachment, while women with higher prenatal attachment scored slightly lower on the Trait Form, although this difference was not statistically significant. An equal number of women who were low and high in prenatal attachment met the threshold on the STAI for trait anxiety at 4-10 weeks postpartum. No trends were identified between prenatal attachment and postpartum anxiety.

Implications. It appears that women who reach a certain point in pregnancy, regardless of their intention to become pregnant or their thoughts about abortion, become equally invested in the fetus prior to or during antepartum hospitalization. These factors alone should not raise concern for those treating pregnant women during hospitalization. Independent of these factors, women may have feelings of depression, anxiety, or apathy toward their fetus. There is great potential in identifying these women, so they may be offered counseling or education.

Because the support a woman receives from her partner is so important to her relationship with her child not only during pregnancy, but also once the baby is born, identifying relationships that are strained may prove to be an important step in intervention. The current study adds to the literature by extending the

finding that there is a positive association between the quality of a woman's relationship with her mate and with her fetus to women hospitalized during high-risk pregnancy. Instruments measuring relationship functioning, such as the Dyadic Adjustment Scale, are rather easy to administer and to score, and the hospitalized women in the current sample were often receptive to doing something constructive to pass the time. A recent study teaching both communication and coping skills to married couples demonstrated that such programs can improve both marital satisfaction and the psychological well-being of both partners (Pihet, Bodenmann, Cina, Widmer, & Shantinath, 2007). If at-risk couples can be identified and appropriate interventions are available, this has the potential to improve the dyadic functioning of the couple, the well-being of each individual, and, consequently, the emotional availability of both parents to the child. A positive relationship between parents facilitates a secure attachment between mother and child.

Data on postpartum symptoms of depression were limited. There were medium, but nonsignificant, correlations between prenatal attachment and postpartum depression. It was also observed that women who met threshold criteria on the depression screening instruments tended to have higher prenatal attachment scores. This latter finding must be interpreted with caution, as there were only four women in this subset who had elevated scores on the depression screening tools. In addition, the screening instruments used in the current study

have high sensitivity and low specificity. Although data from the current study are limited with regard to the relationship between prenatal attachment and postpartum depression, future research with a larger sample could help elucidate this association. The limited data on postpartum anxiety was insufficient to identify any trends in relation to prenatal attachment. Due to the few respondents at this time point, however, it would be premature to reject the possibility that associations exist between maternal-fetal attachment and postpartum anxiety symptoms.

Identifying whether prenatal attachment may be related to postpartum symptoms of depression or anxiety most likely has more theoretical value than clinical utility. If clear associations could be identified, predicting postpartum depression and anxiety would require the measurement of prenatal attachment. Even if a woman's level of maternal-fetal attachment might indicate whether she is more or less likely to struggle with postpartum depression or anxiety, it will not be able to predict these serious and debilitating disorders with the precision that is desired or necessary. Women should receive routine screening for depression and anxiety during postpartum visits to the baby's pediatrician for well-baby care. Given the prevalence and the potential impact that depression and anxiety have on a woman and her baby, regular assessment of the mother's well-being should be the standard of care.

Limitations. Follow-up with women during the postpartum period proved to be quite challenging. As no incentives were offered to participants to return the postpartum study measures, the attrition rate was rather high. As a result, the number of responses received at this time point was too limited to find any statistically significant relationships between postpartum depression and anxiety symptoms and other variables.

Although forty-four percent of the women who completed the depression screening measures met the threshold score at baseline, the specificity of these instruments is quite low. Due to the anticipated patient burden, participants were not routinely given a comprehensive diagnostic instrument, such as the Structured Clinical Interview for DSM-IV diagnoses. Consequently, definitive diagnoses were not made with these women.

The mean MAAS score in the current sample was higher than the mean score reported by Condon (1993). Women who are hospitalized during pregnancy are likely to have more thoughts and feelings about their fetus, so this needs to be considered when comparing mean scores across studies. A shortcoming of the current study is that there was no low-risk pregnancy comparison group recruited simultaneously to complete the same study measures. Such a sample would have been beneficial in differentiating which factors are related to all pregnancies versus the factors associated with a high-risk pregnancy requiring hospitalization.

Conclusion.

Women who are hospitalized during pregnancy for obstetric complications appear to develop a bond with their fetus at least as well as women with low-risk pregnancies. There is some evidence that women who are hospitalized may pay more attention to their growing child. An unplanned pregnancy and the consideration of aborting a pregnancy were two factors that were hypothesized to interfere with a woman's attachment to her fetus. The findings of this study suggest that whether a pregnancy was planned does not impact the formation of a maternal-fetal bond in hospitalized women. Further, the relationship between a maternal-fetal bond and consideration of terminating pregnancy was not statistically significant. A positive mate relationship, however, seems to enhance a woman's ability to bond with her fetus. The maternal-fetal bond may be positively associated with postpartum levels of depression; however, a small sample precluded a statistically significant relationship between these variables. For women who report poor mate relationships, interventions aimed at improving communication and coping skills may be indicated.

Figure 1
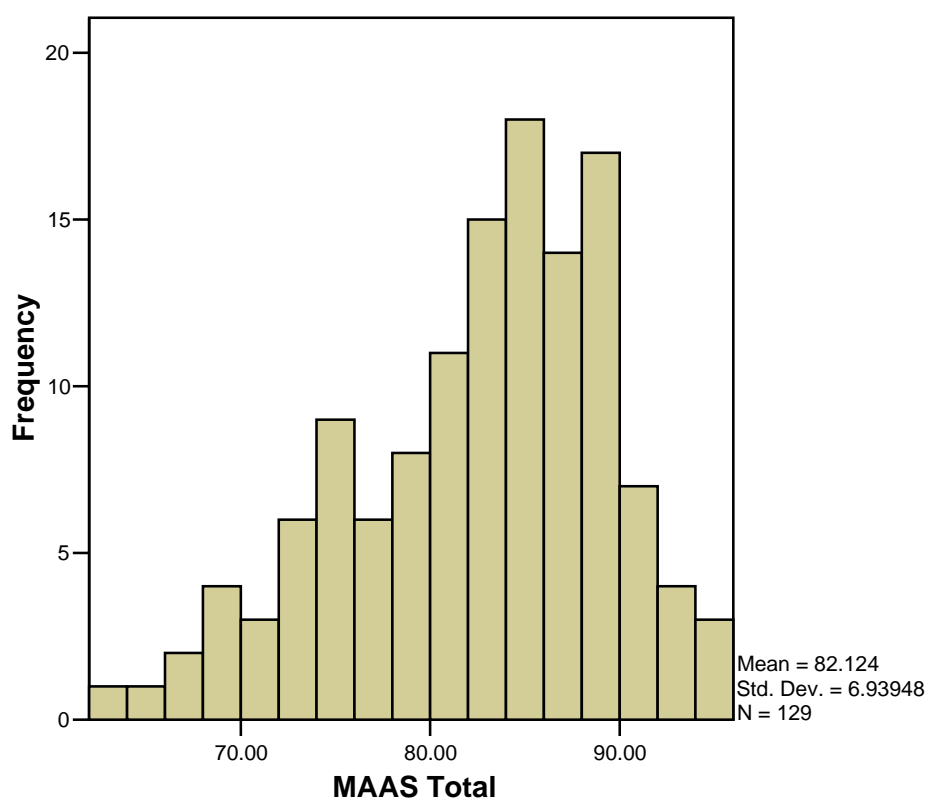
Distribution of Maternal Antenatal Attachment Scale (MAAS) scores.

Figure 2
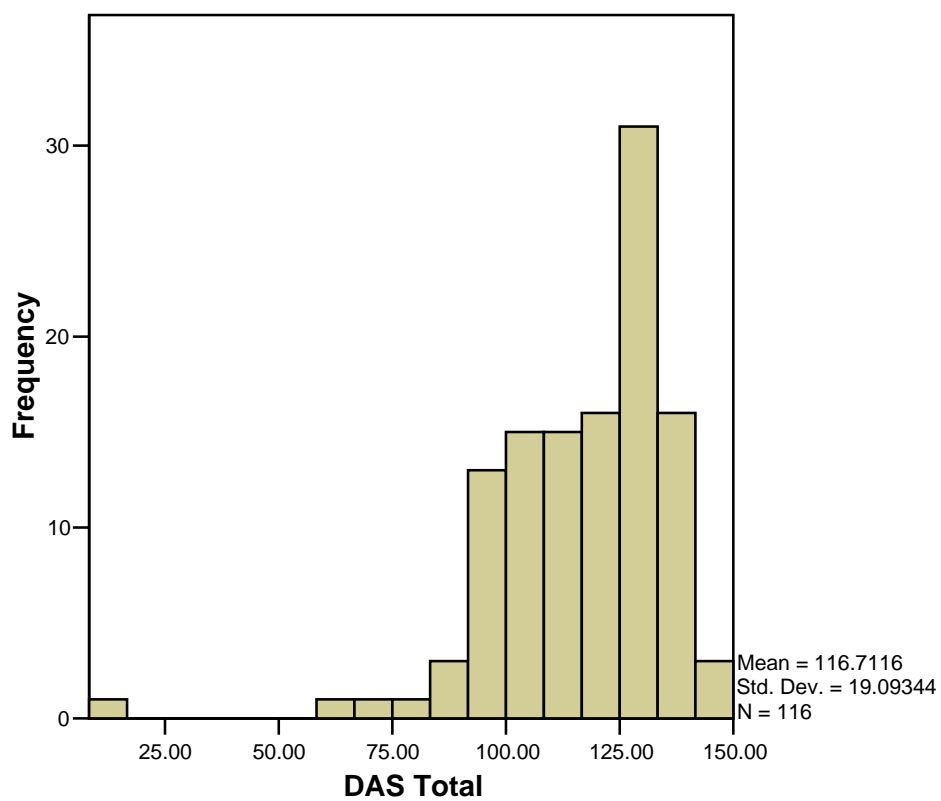
Distribution of Dyadic Adjustment Scale (DAS) scores.

Figure 3
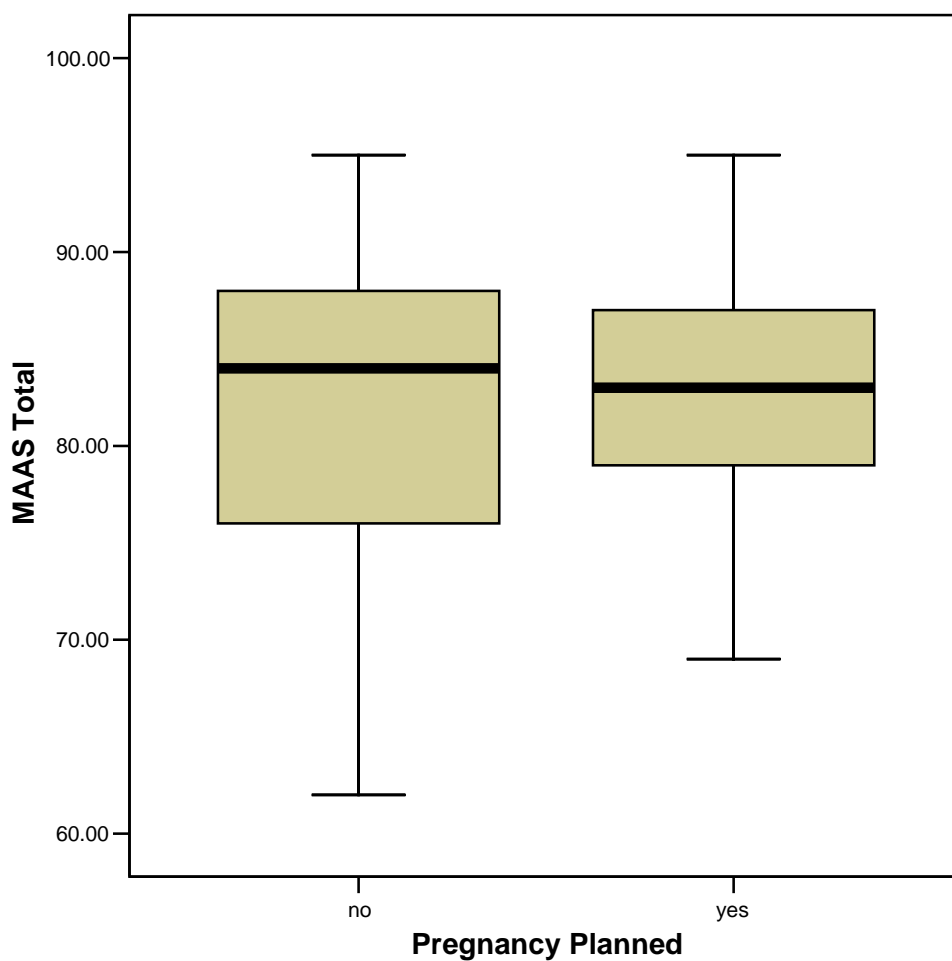
Distributions of Maternal Antenatal Attachment Scale scores (*n* = 126) for women
with planned (*n* = 52; 41.3%) and unplanned (*n* = 74; 58.7%) pregnancies.

Figure 4
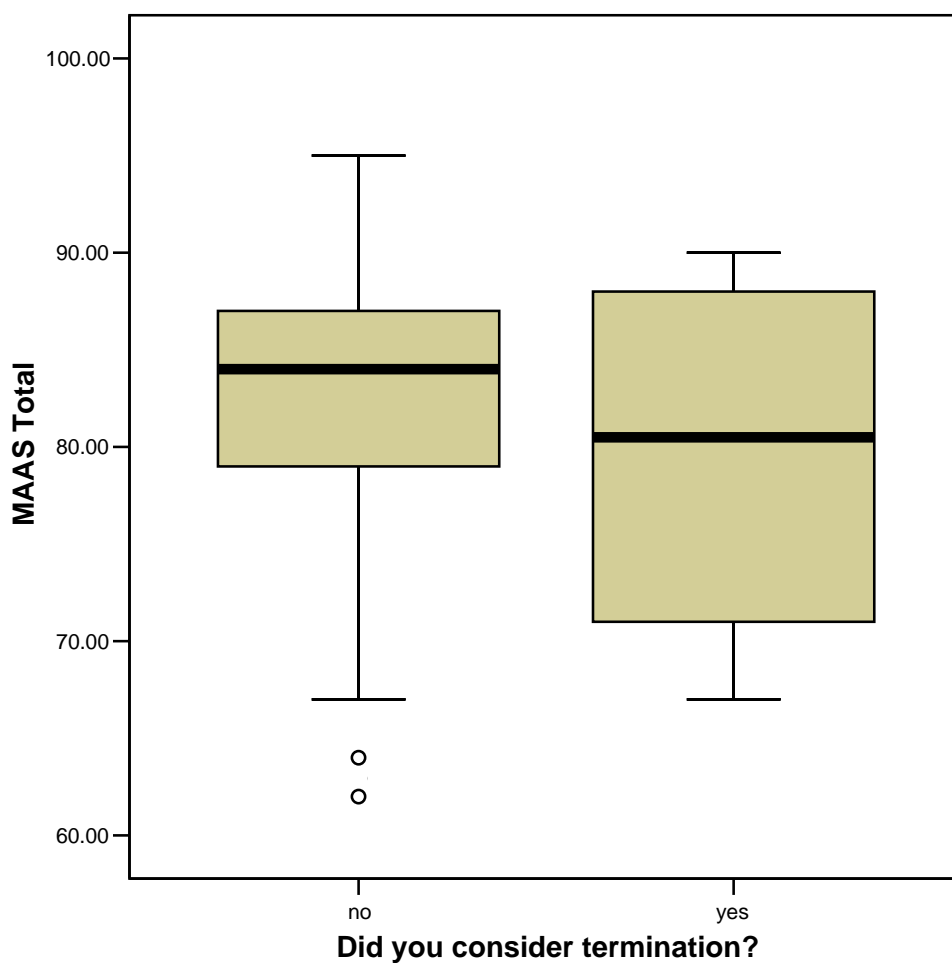
Distributions of Maternal Antenatal Attachment Scale scores (*n* = 126) for women who did not consider elective termination of pregnancy (*n* = 116; 92.1%) and for women who did (*n* = 10; 7.9%).

Figure 5
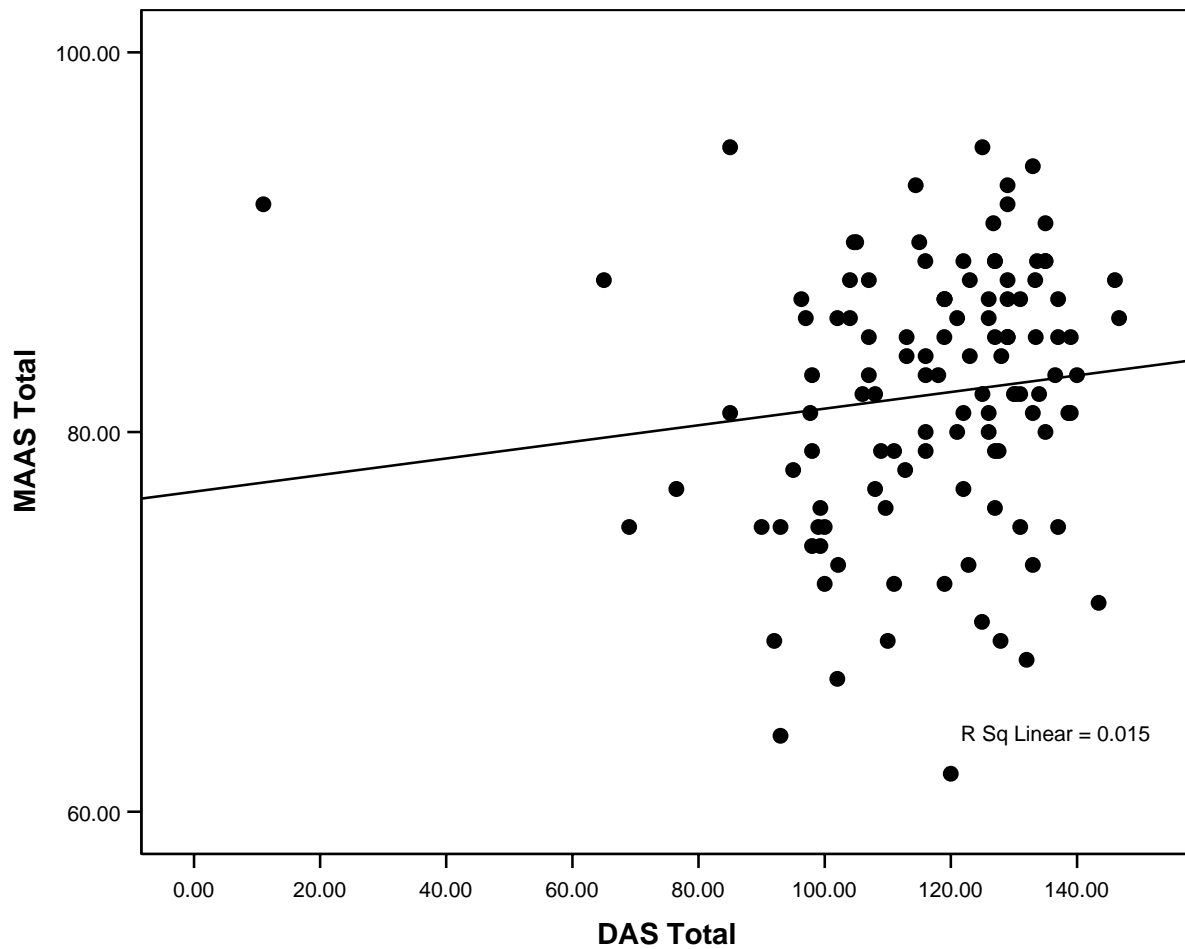
Association between total scores on the Dyadic Adjustment Scale and the Maternal Antenatal Attachment Scale ($n = 116$; Pearson $r(114) = .12$; $p = .098$, 1-tailed).

Figure 6
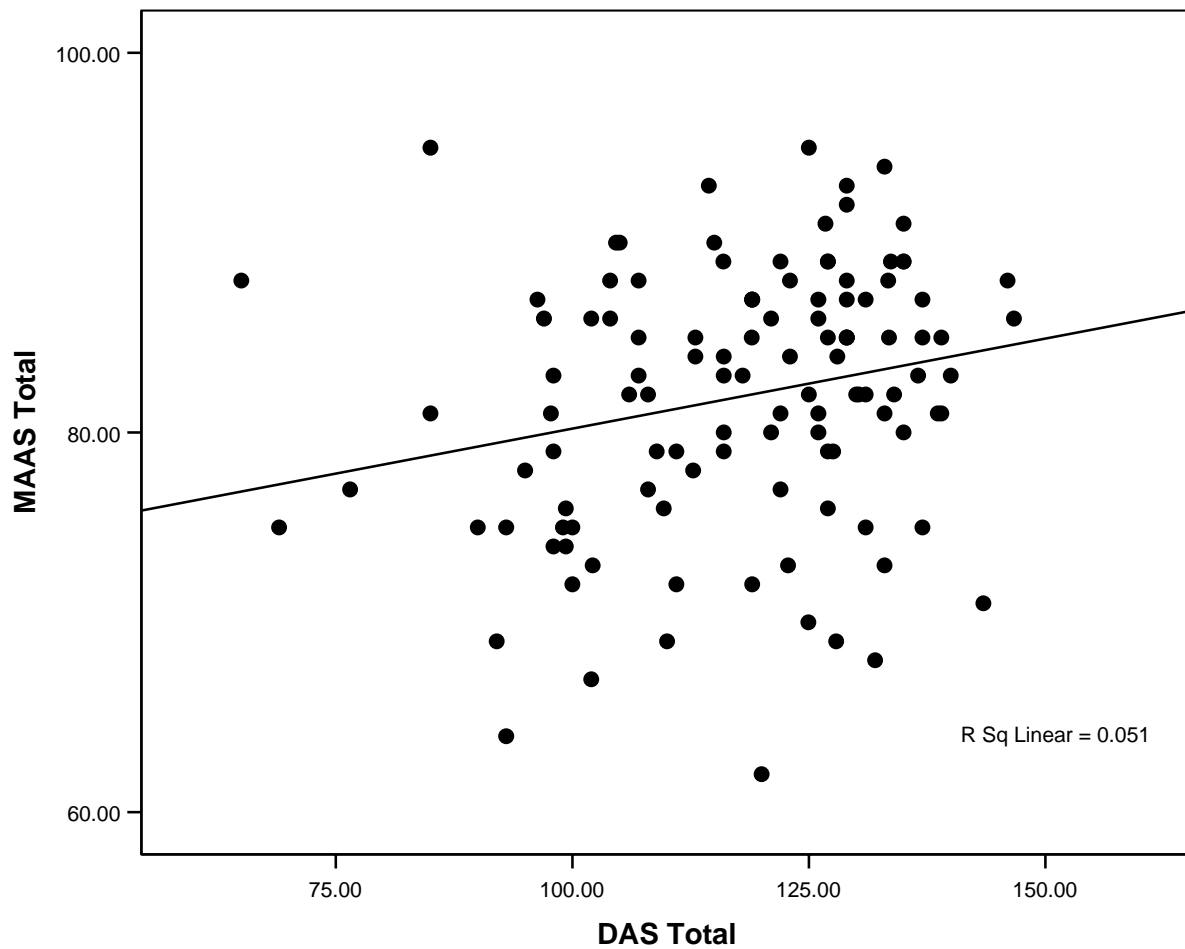
Relationship between total scores on the Dyadic Adjustment Scale and the Maternal Antenatal Attachment Scale (outlier removed; *n* = 115; Pearson *r*(113) = .23; *p* < .01, 1-tailed).

Figure 7
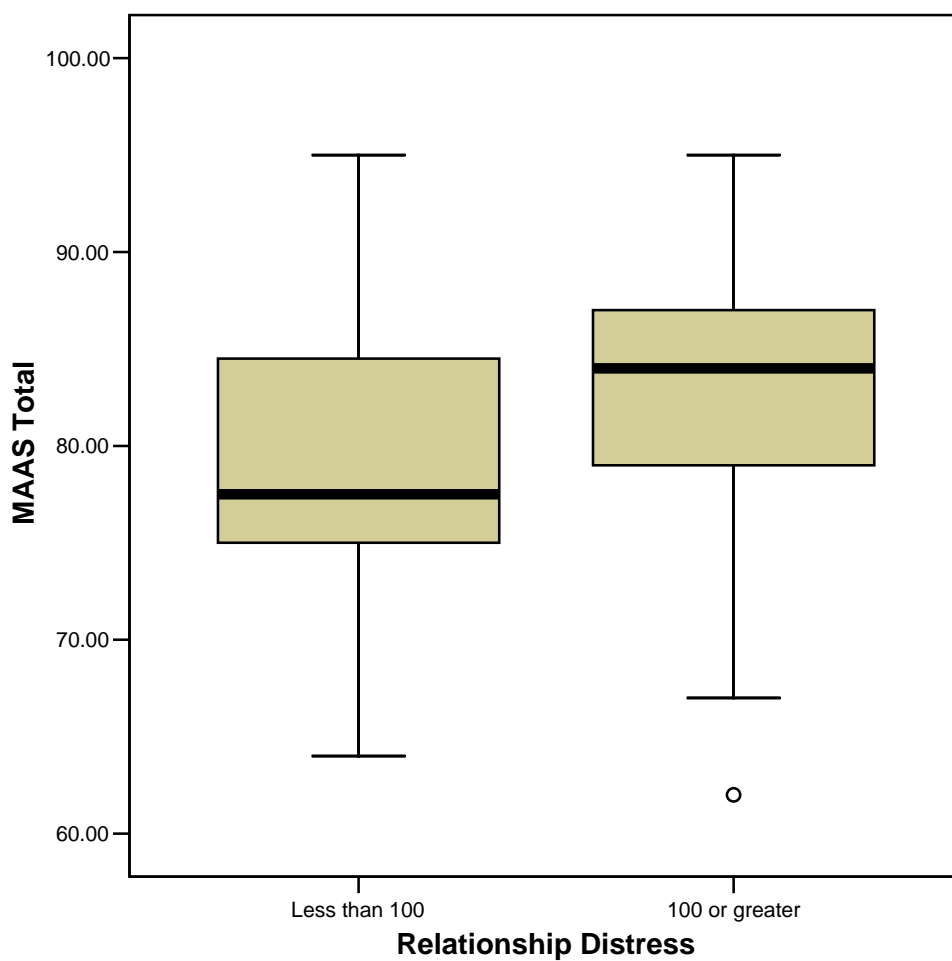
Distributions of Maternal Antenatal Attachment Scale scores for women with distressed (<100; *n* = 19; 17.2%) and non-distressed (> 100; *n* = 96; 82.8%) scores on the Dyadic Adjustment Scale (*n* = 116).

Figure 8
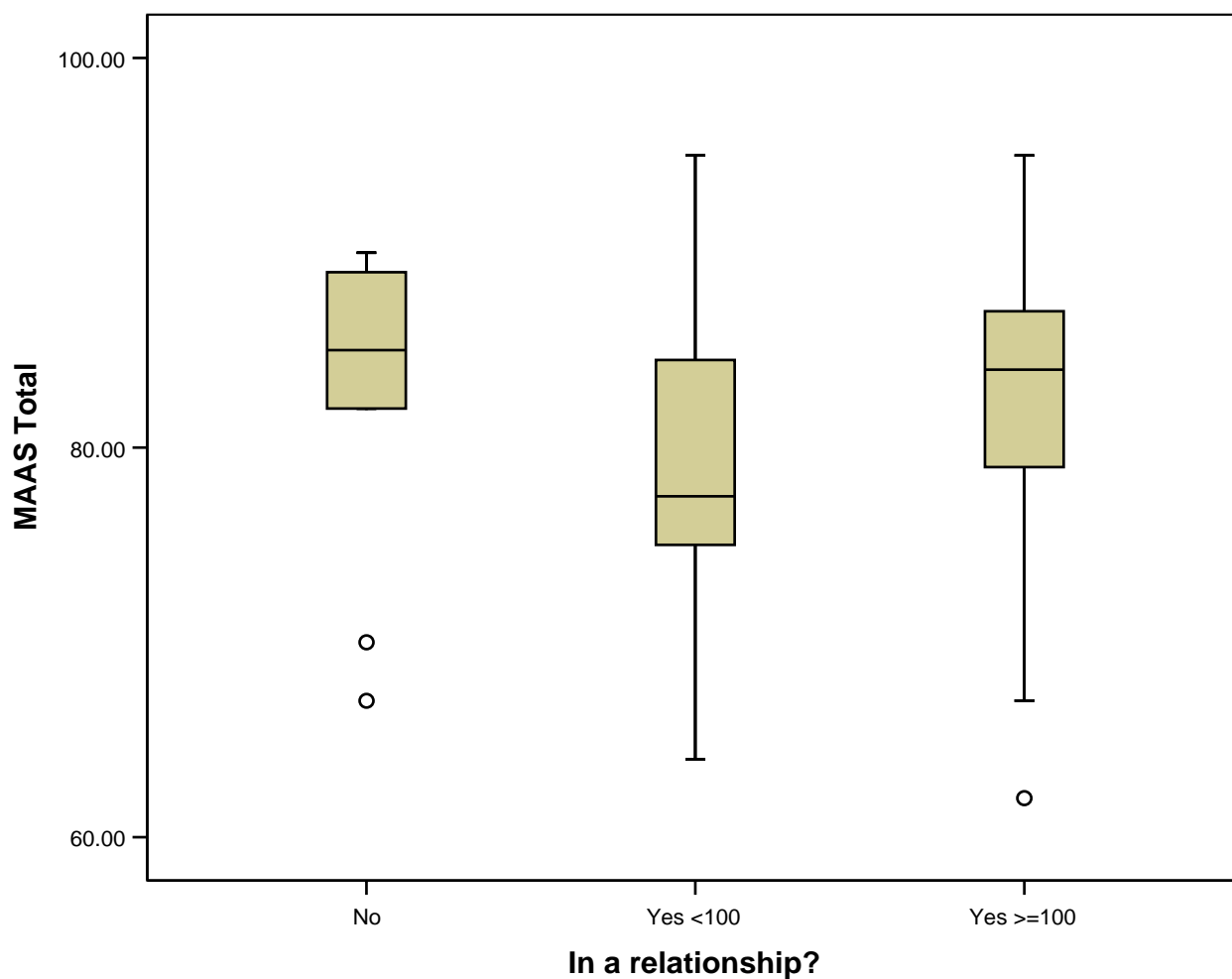
Distributions of scores (*n* = 129) on the Maternal Antenatal Attachment Scale for women not in a committed romantic relationship (*n* = 13; 10.1%), women in a strained relationship (Dyadic Adjustment Scale total < 100; *n* = 19; 15.5%), and women in a satisfying relationship (Dyadic Adjustment Scale total ≥ 100; *n* = 96; 74.4%).

Figure 9
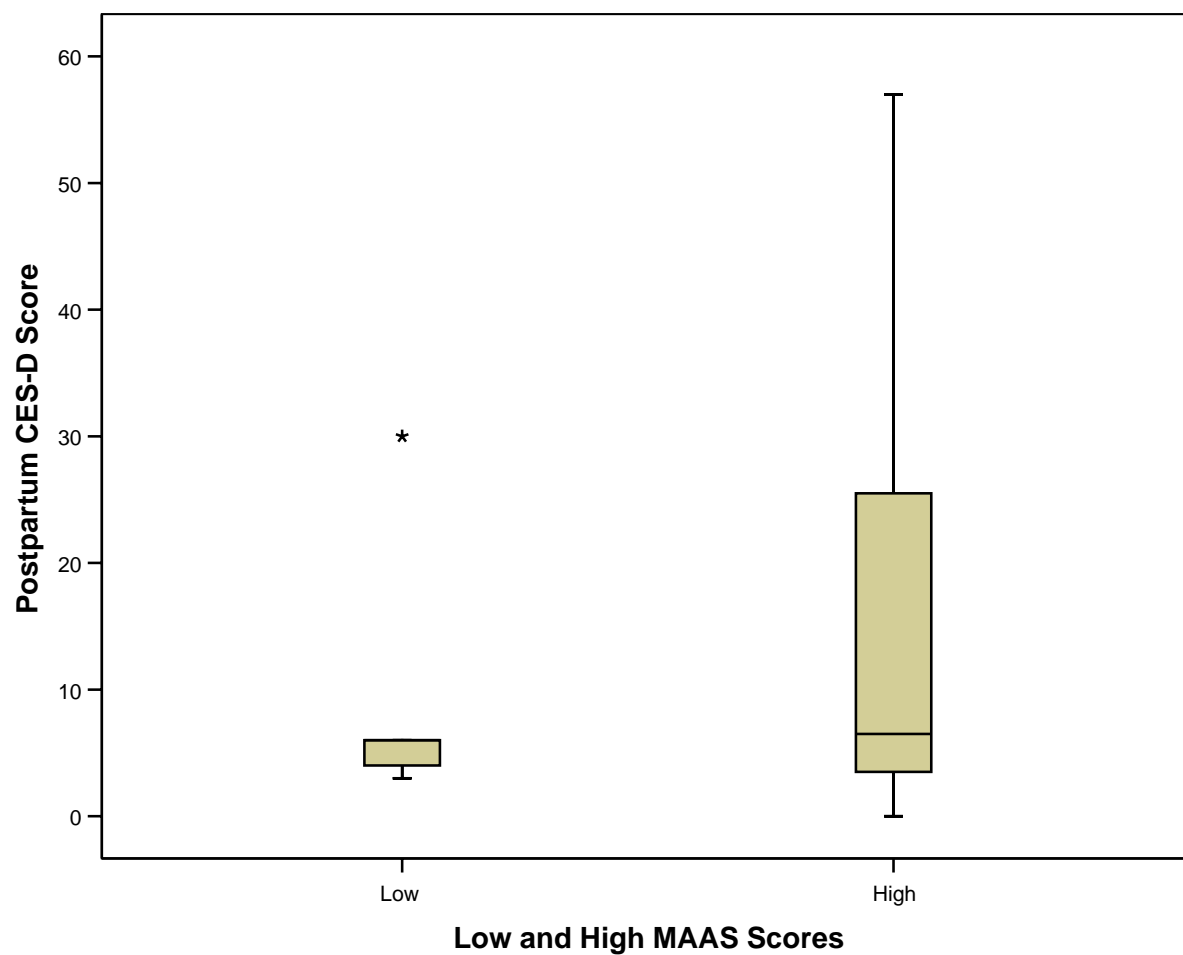
Distributions of Center for Epidemiological Studies Depression Scale scores for women low (*n* = 6) and high (*n* = 8) in Maternal Antenatal Attachment Scale scores.

Figure 10
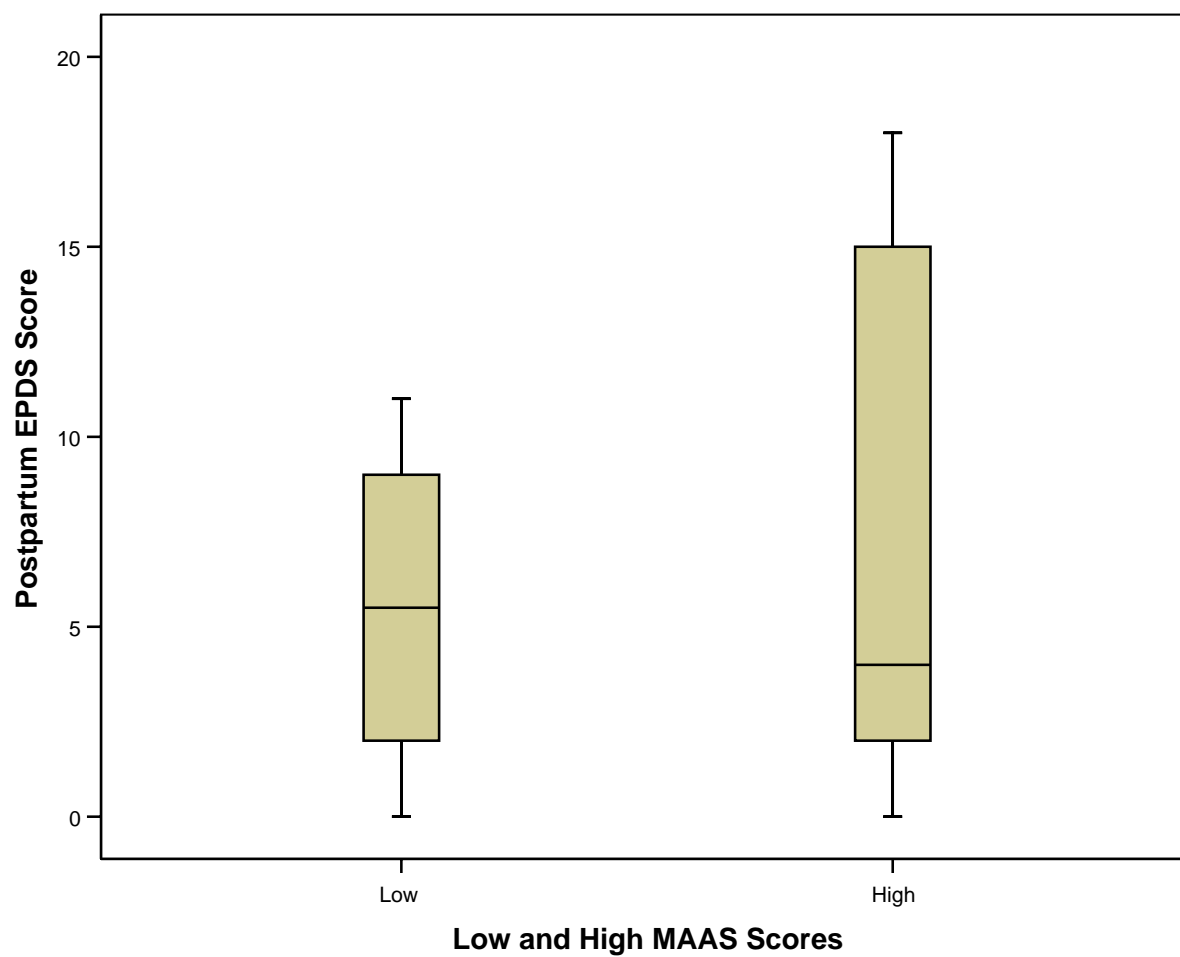
Distributions of Edinburgh Postnatal Depression Scale scores for women low (*n* = 6) and high (*n* = 8) in Maternal Antenatal Attachment Scale scores.

Figure 11
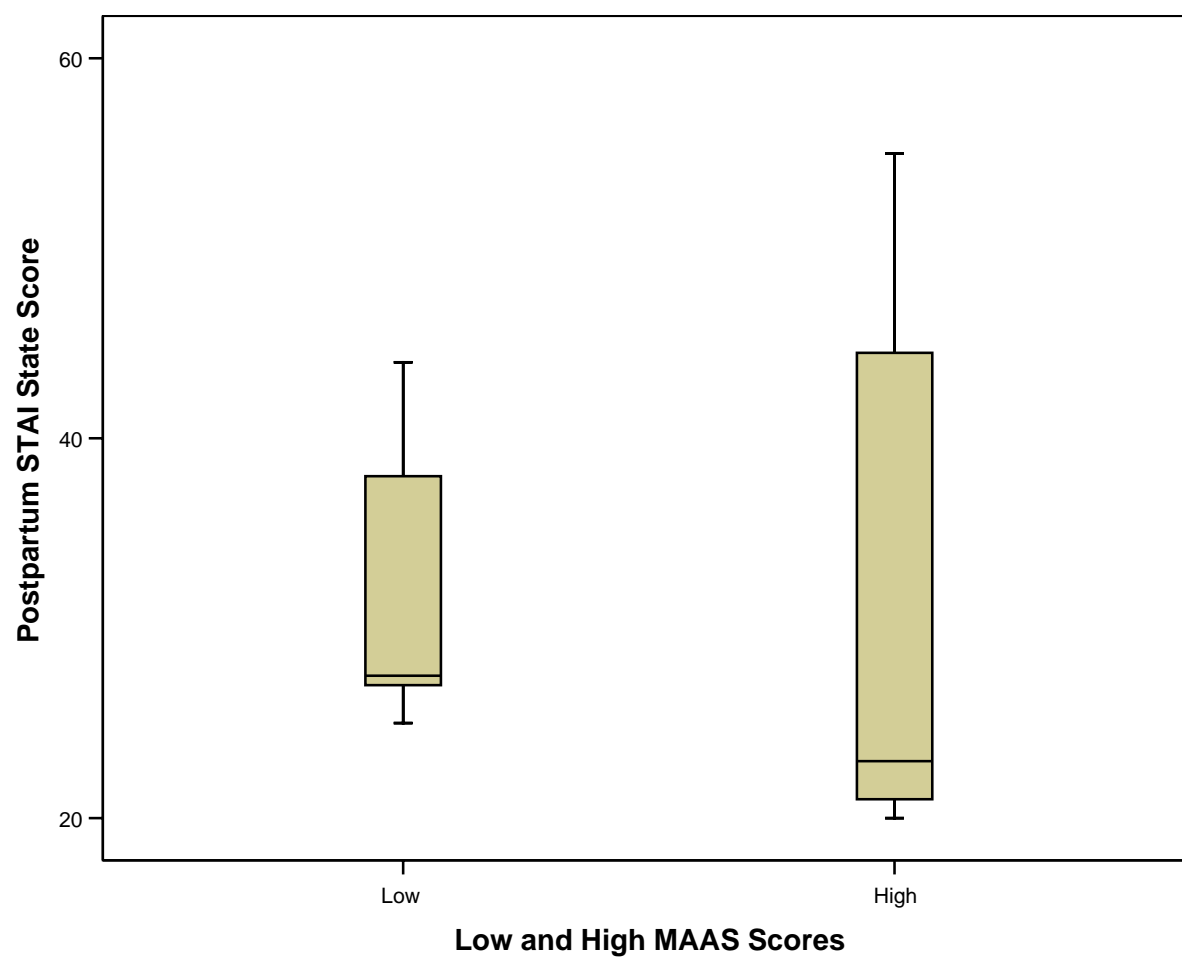
Distributions of State-Trait Anxiety Inventory-State Form scores for women low ($n = 6$) and high ($n = 8$) in Maternal Antenatal Attachment Scale scores.

Figure 12
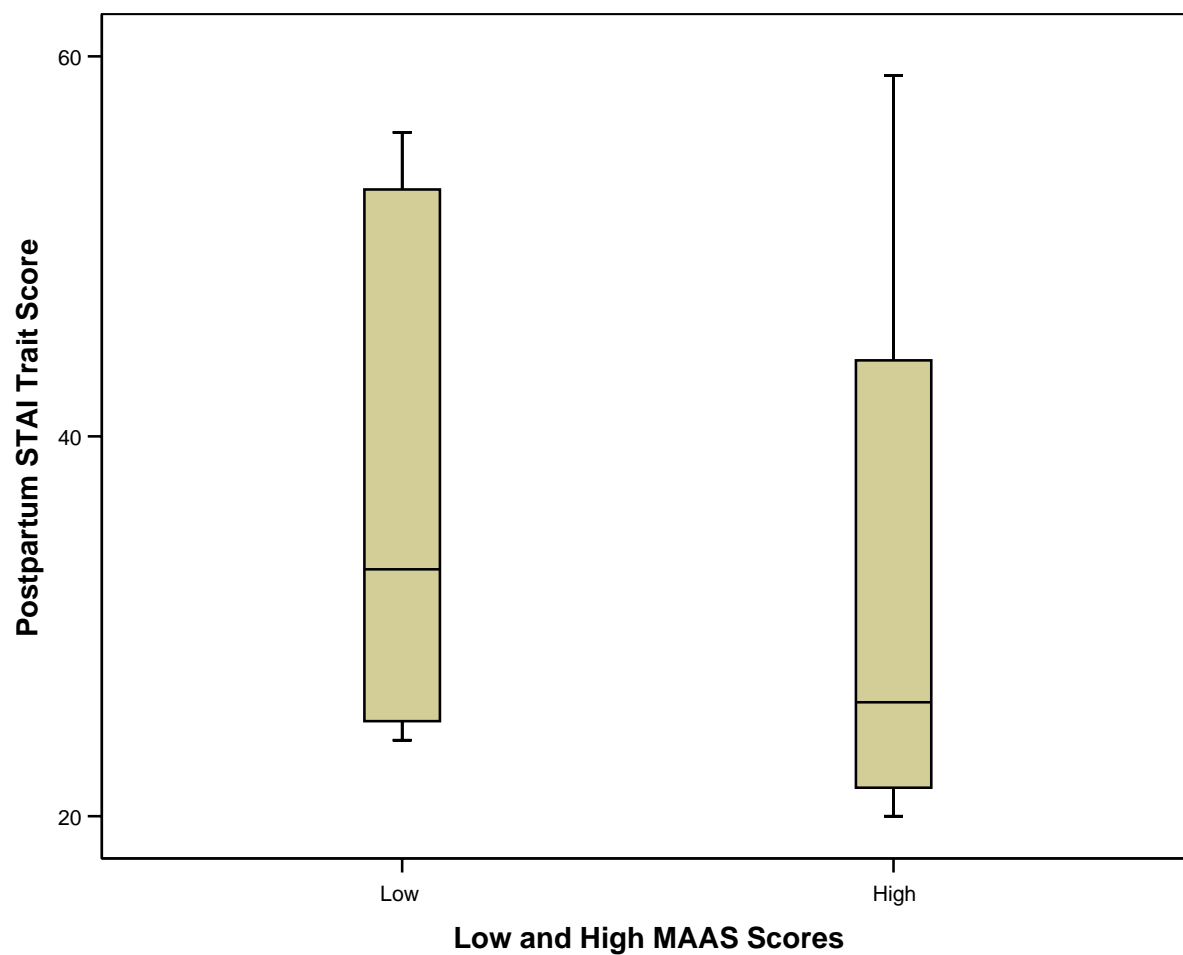
Distributions of State-Trait Anxiety Inventory-Trait Form scores for women low ($n = 6$) and high ($n = 7$) in Maternal Antenatal Attachment Scale scores.

Table 1

Demographic Characteristics of Total Sample (n = 129)

Variable	n	%	Dallas County %
Ethnicity (*n* = 129)			
African American	42	32.6	21.0
Caucasian	70	54.3	37.1
Hispanic	14	10.9	36.8
Asian	2	1.6	4.7
Other	1	0.8	0.4
Marital Status (*n* = 127)			
Single	41	32.3	-
Married	66	52.0	-
Separated	4	3.1	-
Cohabitating	16	12.6	-
Education (*n* = 127)			
Less than Ninth Grade	1	0.8	-
Some High School	16	12.6	-
High School or Equivalent	31	24.4	-
Some College	44	34.1	-
Undergraduate Degree or Higher	35	27.6	-

Table 1 (continued)

Variable	*n*	%
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
Household Income (*n* = 126)		
Under $12,000	14	11.1
$12,000-25,999	30	23.8
$26,000-40,999	25	19.8
$41,000-65,000	20	15.9
Over $65,000	37	29.4
Health Insurance (*n* = 127)		
No Insurance	2	1.6
Private Insurance	61	48.0
Medicaid	64	50.4
	Mean (*SD*)	Range
Age (*n* = 129)	27.6 (6.4)	17-44

Note: Dallas County Data calculated from American Community Survey, U. S.
Census Bureau, 2005.

Table 2

Pregnancy Characteristics of Sample (n = 128)

Variable	*n*	%
Planned Pregnancy (*n* = 126)	52	41.3
Considered Elective Termination (*n* = 126)	10	7.9
Total Prior Pregnancies		
0	36	28.1
1	33	25.8
2	24	18.8
3	17	13.3
4	7	5.5
5 or more	11	8.7
Previous Neonatal Demise	6	4.7
Previous Stillborn	3	2.3
Previous Miscarriage	41	32.3
Previous Pregnancy Termination	10	7.8
Onset of Complications		
First Trimester	24	19.0
Second Trimester	45	35.7
Third Trimester	57	45.2
Complications with Previous Pregnancies	55	43.3

Table 3

Psychiatric Characteristics of Sample (n = 125)

Variable	*n*	%
Previous Psychiatric History		
Depression	14	11.2
Anxiety	10	8.0
Comorbid Mood and Anxiety Disorders	5	4.0
Bipolar Disorder	1	0.8
None	95	76.0
Previous Psychiatric Medication	35	28.0
Previous Psychiatric Hospitalization	5	4.0
Previous Counseling	34	27.2
Current Psychiatric Medication	9	7.2
Family History of Psychiatric Illness	38	30.4

Table 4

Means, Standard Deviations, and Ranges of Measures Completed at Baseline

Measure	*n*	*M*	*SD*	% Meeting Threshold	Range
Depression Symptoms (Screening Measures)					
EPDS (Depression suggested at ≥ 11)	129	9.48	5.83	44.2	0-23
CES-D (Depression suggested at ≥ 16)	110	15.93	10.15	44.1	0-39
Anxiety Symptoms (Screening Measures)					
STAI-State (Anxiety suggested at ≥ 42)	128	40.47	11.84	46.1	20-68
STAI-Trait (Anxiety suggested at ≥ 41)	129	37.72	10.42	41.9	20-69
Maternal-Fetal Attachment					
MAAS Global Attachment Score	129	82.12	6.94	N/A	62-95
Dyadic Adjustment					
DAS Total Score	116	116.71	19.09	N/A	11-147

Note: EPDS = Edinburgh Postnatal Depression Scale
CES-D = Center for Epidemiological Studies Depression Scale
STAI = State Trait Anxiety Inventory
MAAS = Maternal Antenatal Attachment Scale
DAS = Dyadic Adjustment Scale

Table 5

Comparison of Prenatal Attachment Scores for Women with Unplanned and Planned Pregnancies and Results of Independent-samples t test (n = 126)

	Unplanned Mean (*SD*)	Planned Mean (*SD*)	*t* value
Maternal Antenatal Attachment Scale Score	82.15 (7.54) *n* = 74 (58.7%)	82.62 (5.73) *n* = 52 (41.3%)	-0.39 *p* = .69

Table 6

Two-way Contingency Table of Prenatal Attachment Scores for Women with Unplanned and Planned Pregnancies (n = 126)

Maternal Antenatal Attachment Scale Score	Unplanned n (%)	Planned n (%)	
Low $\leq$ 83	34 (27.0%)	29 (23.0%)	
High > 83	40 (31.7%)	23 (18.3%)	
			$\chi^2 = 1.18, p = .28$

Table 7

Two-way Contingency Table of Prenatal Attachment Scores for Women with Unplanned and Planned Pregnancies by Standard Deviation (n = 38)

Maternal Antenatal Attachment Scale Score	Unplanned n (%)	Planned n (%)
Low < 75.5 (1 *SD* Below Mean)	18 (47.4%)	6 (15.8%)
High > 89.2 (1 *SD* Above Mean)	8 (21.1%)	6 (15.8%)

$\chi^2 = 1.31, p = .25$

Table 8

Comparison of Prenatal Attachment Scores for Women Who Did Not and Women Who Did Consider an Elective Termination of Current Pregnancy and Results of Independent-samples t test (n = 126)

	Did Not Consider Termination Mean (*SD*)	Considered Termination Mean (*SD*)	*t* value
Maternal Antenatal Attachment Scale Score	82.60 (6.63) *n* = 116 (92.1%)	79.30 (8.69) *n* = 10 (7.9%)	1.47 *p* = .14

Table 9

Two-way Contingency Table of Prenatal Attachment Scores for Women Who Did Not and Women Who Did Consider an Elective Termination of Current Pregnancy

Maternal Antenatal Attachment Scale Score	Did Not Consider Termination n (%)	Considered Termination n (%)	
Low ≤ 83	57 (45.2%)	6 (4.8%)	
High > 83	59 (46.8%)	4 (3.2%)	
			$\chi^2 = 0.43$, $p = .51$

Table 10

Two-way Contingency Table of Prenatal Attachment Scores for Women Who Did Not and Women Who Did Consider an Elective Termination of Current Pregnancy by Standard Deviation

Maternal Antenatal Attachment Scale Score	Did Not Consider Termination n (%)	Considered Termination n (%)	
Low < 75.5 (1 *SD* Below Mean)	20 (50.0%)	4 (10.0%)	
High > 89.2 (1 *SD* Above Mean)	15 (37.5%)	1 (2.5%)	$\chi^2 = 0.95, p = .33$

Table 11

Pearson Correlation Coefficients for Maternal Antenatal Attachment Scale Scores and Dyadic Adjustment Scale Scores

	DAS Score With Outlier ($n = 116$)	DAS Score No Outlier ($n = 115$)
Maternal Antenatal Attachment Scale Score	$r(114) = .12$ $p = .098$	$r(113) = .23$ $p < .01$

Note: DAS = Dyadic Adjustment Scale

Table 12

Comparison of Prenatal Attachment Scores for Women Who Reported Distressed and Non-distressed Relationships on the Dyadic Adjustment Scale and Results of Independent-samples t test (n = 115).

	Distressed Relationship Mean (*SD*)	Non-Distressed Relationship Mean (*SD*)	*t* value
Maternal Antenatal Attachment Scale Score	78.53 (7.16) *n* = 19 (16.5%)	82.54 (6.67) *n* = 96 (83.5%)	-2.37 *p* = .01 (1-tailed)

Note: Distressed relationship is defined as a total Dyadic Adjustment Scale score of less than 100. Non-distressed relationship is a score of 100 or greater.

Table 13

Comparison of Prenatal Attachment Scores and Dyadic Adjustment by Relationship Status and Analysis of Variance (n = 127).

	Single/Did Not Complete DAS Mean (*SD*)	Distressed Relationship Mean (*SD*)	Non-Distressed Relationship Mean (*SD*)	*df*	*F*	η	*p*
Maternal Antenatal Attachment Scale	83.42 (7.56) *n* = 12 (9.4%)	78.53 (7.16) *n* = 19 (15.0%)	82.54 (6.67) *n* = 96 (75.6%)	2	3.02	.046	.052

Note: Distressed relationship is defined as a total Dyadic Adjustment Scale score of less than 100. Non-distressed relationship is a score of 100 or greater.

Table 14

Predictors Entering Multiple Linear Regression for Antenatal Attachment

Variable(s) Predicting MAAS Scores	R	R^2	Adjusted R^2	F	p
DAS Score	.206	.042	.034	4.909	.029

Note: MAAS = Maternal Antenatal Attachment Scale
        DAS = Dyadic Adjustment Scale

Table 15

Predictors Entering Multiple Linear Regression for Dyadic Adjustment

Variable(s) Predicting DAS Scores	R	R^2	Adjusted R^2	F	p
1st Model: Considering Termination	.217	.047	.039	5.495	.021
2nd Model: MAAS Score; Considering Termination	.275	.076	.059	4.501	.013

Note: MAAS = Maternal Antenatal Attachment Scale
DAS = Dyadic Adjustment Scale
R^2 Change = .028, $F(1, 110) = 3.39$, $p = .068$

Table 16

Predictors Entering Binomial Logistic Regression for Antenatal Attachment

Variable(s) Predicting Low or High MAAS Scores	B	Wald	p	Odds Ratio	95% Confidence Interval
DAS Score	.025	4.145	.042	1.026	1.001-1.051

Note: MAAS = Maternal Antenatal Attachment Scale (Low = at or below median; High = above median)
       DAS = Dyadic Adjustment Scale

Table 17

Predictors Entering Binomial Logistic Regression for Dyadic Adjustment

Variable(s) Predicting Low or High DAS Scores	B	Wald	p	Odds Ratio	95% Confidence Interval
Considered Termination	-1.974	4.167	.041	0.139	0.021-0.924
Household Income	0.730	4.092	.043	2.075	1.023-4.209

Note: DAS = Dyadic Adjustment Scale (Low < 100; High ≥ 100)

Table 18

Predictors Entering Binomial Logistic Regression for Dyadic Adjustment by Standard Deviation

Variable(s) Predicting Low or High DAS Scores	*B*	Wald	*p*	Odds Ratio	95% Confidence Interval
MAAS Score	0.146	4.257	.039	1.158	1.007-1.330
Household Income	1.293	5.193	.023	3.642	1.198-11.07

Note: DAS = Dyadic Adjustment Scale (Low < 100; High ≥ 100)
MAAS = Maternal Antenatal Attachment Scale

Table 19

Comparison of Dyadic Adjustment by Household Income and Analysis of Variance (n = 113).

	HHI < $26,000 Mean (*SD*)	HHI = $26,000 - $65,000 Mean (*SD*)	HHI > $65,000 Mean (*SD*)	*df*	*F*	η	*p*
Dyadic Adjustment Scale Score	113.26 (17.91) *n* = 35 (31.0%)	116.49 (16.77) *n* = 41 (36.3%)	122.70 (13.64) *n* = 37 (32.7%)	2	3.19	.055	.045

Note: HHI = Household Income (annual)

Table 20

Comparison of Prenatal Attachment by Household Income and Analysis of Variance (n = 125).

	HHI < $26,000 Mean (SD)	HHI = $26,000 - $65,000 Mean (SD)	HHI > $65,000 Mean (SD)	df	F	η	p
Maternal Antenatal Attachment Scale Score	81.75 (7.56) *n* = 44 (35.2%)	82.69 (7.12) *n* = 45 (36.0%)	83.00 (5.15) *n* = 36 (28.8%)	2	0.38	.006	.685

Note: HHI = Household Income (annual)

Table 21

Means, Standard Deviations, and Ranges of Measures Completed 4-10 Weeks Postpartum

Measure	*n*	*M*	*SD*	Range
Depression Symptoms (Screening Measures)				
EPDS	14	6.6	6.0	0-18
(Depression suggested at ≥ 11)				
CES-D	14	13.1	16.7	0-57
(Depression suggested at ≥ 16)				
Anxiety Symptoms (Screening Measures)				
STAI-State	14	31.5	11.7	20-55
(Anxiety suggested at ≥ 42)				
STAI-Trait	13	35.4	15.0	20-59
(Anxiety suggested at ≥ 41)				

Note: EPDS = Edinburgh Postnatal Depression Scale
CES-D = Center for Epidemiological Studies Depression Scale
STAI = State Trait Anxiety Inventory
MAAS = Maternal Antenatal Attachment Scale
DAS = Dyadic Adjustment Scale

Table 22

*Antepartum CES-D Scores for Women Who Did and Did Not Complete
Postpartum Measures and Results of Independent-samples t test (n = 111).*

	Did Complete Postpartum Measures Mean (*SD*)	Did Not Complete Postpartum Measures Mean (SD)	*t* value
Antepartum CES-D Score	9.85 (7.48) *n* = 13 (11.7%)	16.77 (10.15) *n* = 98 (88.3%)	2.37 *p* = .019

Note: CES-D = Center for Epidemiological Studies Depression Scale

Table 23

Pearson correlation coefficients for Maternal Antenatal Attachment Scale Scores and the Postpartum Depression and Anxiety Measures (n = 14).

	EPDS	CES-D	STAI-S	STAI-T (*n* = 13)
Maternal Antenatal Attachment Scale score	*r*(14) = .27 *p* = .35	*r*(14) = .31 *p* = .29	*r*(14) = .11 *p* = .70	*r*(13) = -.03 *p* = .93

Note: EPDS = Edinburgh Postnatal Depression Scale
CES-D = Center for Epidemiological Studies Depression Scale
STAI-S = State Trait Anxiety Inventory-State Form
STAI-T = State Trail Anxiety Inventory-Trait Form

Table 24

Postpartum CES-D Scores for Women with Low and High Prenatal Attachment
Scores and Results of Independent-samples t test (n = 14).

	Low MAAS Score Mean (*SD*)	High MAAS Score Mean (SD)	*t* value
CES-D Score 4-10 Weeks Postpartum	9.17 (10.3) *n = 6 (42.9%)*	16.00 (20.5) *n = 8 (57.1%)*	-0.75 *p = .47*

Note: CES-D = Center for Epidemiological Studies Depression Scale
MAAS = Maternal Antenatal Attachment Scale
Low MAAS score was below the median for this subset.
High MAAS score was at or above the median for this subset.

Table 25

Postpartum EPDS Scores for Women with Low and High Prenatal Attachment Scores and Results of Independent-samples t test (n = 14).

	Low MAAS Score Mean (*SD*)	High MAAS Score Mean (*SD*)	*t* value
EPDS Score 4-10 Weeks Postpartum	5.50 (4.14) *n = 6 (42.9%)*	7.50 (7.25) *n = 8 (57.1%)*	-0.65 *p = .53*

Note: EPDS = Edinburgh Postnatal Depression Scale
MAAS = Maternal Antenatal Attachment Scale
Low MAAS score was below the median for this subset.
High MAAS score was at or above the median for this subset.

Table 26

Postpartum Depression by Prenatal Attachment Controlling for Antepartum Depression and Analysis of Variance (n = 13).

	Low MAAS Score Mean (*SD*)	High MAAS Score Mean (*SD*)	*df*	*F*	Partial η2	*p*
Postpartum CES-D Score	9.80 (11.37) *n* = 5 (38.5%)	16.00 (20.47) *n* = 8 (61.5%)	10	0.99	.09	.343

Note: CES-D = Center for Epidemiological Studies Depression Scale
MAAS = Maternal Antenatal Attachment Scale
Low MAAS score was below the mean for this subset.
High MAAS score was above the mean for this subset.

Table 27

Postpartum Depression by Prenatal Attachment Controlling for Antepartum Depression and Analysis of Variance (n = 14).

	Low MAAS Score Mean (*SD*)	High MAAS Score Mean (*SD*)	*df*	*F*	Partial η2	*p*
Postpartum EPDS Score	5.50 (4.14) *n* = 6 (42.9%)	7.50 (7.25) *n* = 8 (57.1%)	11	0.94	.08	.352

Note: EPDS = Edinburgh Postnatal Depression Scale
MAAS = Maternal Antenatal Attachment Scale
Low MAAS score was below the mean for this subset.
High MAAS score was above the mean for this subset.

Table 28

Two-way Contingency Table of Prenatal Attachment and Postpartum Depression Symptoms

Maternal Antenatal Attachment Scale Score	Below Threshold on EPDS and CES-D *n* (%)	Met Threshold for EPDS and/or CES-D *n* (%)	
Low ≤ 80	5 (35.7%)	1 (7.1%)	
High > 80	5 (35.7%)	3 (21.4%)	
			$\chi^2 = 0.73, p = .39$

Note: EPDS = Edinburgh Postnatal Depression Scale completed 4-10 weeks
         postpartum; threshold = 11
         CES-D = Center for Epidemiological Studies Depression Scale
         completed 4-10 weeks postpartum; threshold = 16

Table 29

Postpartum STAI State Scores for Women with Low and High Prenatal
Attachment Scores and Results of Independent-samples t test (n = 14).

	Low MAAS Score Mean (*SD*)	High MAAS Score Mean (*SD*)	*t* value
STAI-S Score 4-10 Weeks Postpartum	31.50 (7.66) *n = 6* (42.9%)	31.50 (14.51) *n = 8* (57.1%)	0.00 *p* = 1.00

Note: STAI-S = Spielberger State-Trait Anxiety Inventory-State Form
MAAS = Maternal Antenatal Attachment Scale
Low MAAS score was below the median for this subset.
High MAAS score was at or above the median for this subset.

Table 30

Postpartum STAI Trait Scores for Women with Low and High Prenatal Attachment Scores and Results of Independent-samples t test (n = 13).

	Low MAAS Score Mean (*SD*)	High MAAS Score Mean (*SD*)	*t* value
STAI-T Score 4-10 Weeks Postpartum	37.33 (14.22) *n = 6 (46.2%)*	33.71 (16.53) *n = 7 (53.8%)*	0.42 *p = .68*

Note: STAI-T = Spielberger State-Trait Anxiety Inventory-Trait Form
        MAAS = Maternal Antenatal Attachment Scale
        Low MAAS score was below the median for this subset.
        High MAAS score was at or above the median for this subset.

Table 31

Antepartum STAI State Scores for Women with Low and High Prenatal Attachment Scores and Results of Independent-samples t test (n = 14).

	Low MAAS Score Mean (*SD*)	High MAAS Score Mean (*SD*)	*t* value
Antepartum STAI-S Score	36.00 (12.81) *n = 6 (42.9%)*	31.75 (9.22) *n = 8 (57.1%)*	0.73 *p = .48*

Note: STAI-S = Spielberger State-Trait Anxiety Inventory-State Form
        MAAS = Maternal Antenatal Attachment Scale
        Low MAAS score was below the median for this subset.
        High MAAS score was at or above the median for this subset.

Table 32

Postpartum Anxiety by Prenatal Attachment Controlling for Antepartum Anxiety and Analysis of Variance (n = 14)

	Low MAAS Score Mean (*SD*)	High MAAS Score Mean (*SD*)	*df*	*F*	Partial η2	*p*
Postpartum STAI-T Score	37.33 (14.22) *n* = 6 (46.2%)	33.71 (16.53) *n* = 7 (53.8%)	10	0.30	.029	.596

Note: STAI-T = Spielberger State-Trait Anxiety Inventory- Trait Form
MAAS = Maternal Antenatal Attachment Scale
Low MAAS score was below the mean for this subset.
High MAAS score was above the mean for this subset.

Table 33

Two-way Contingency Table of Prenatal Attachment and Postpartum Anxiety Symptoms

Maternal Antenatal Attachment Scale	Below Threshold on STAI n *(%)*	Met Threshold for STAI *n* (%)	
Low < 80	6 (42.9%)	2 (14.3%)	
High ≥ 80	4 (28.6%)	2 (14.3%)	
			$\chi^2 = 0.12, p = .73$

Note: STAI = Spielberger State-Trait Anxiety Inventory-State and Trait Forms
completed 4-10 weeks postpartum. Threshold: State = 42, Trait = 41
Low MAAS score was below the median for this subset.
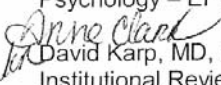High MAAS score was at or above the median for this subset.

APPENDIX

UT SOUTHWESTERN
MEDICAL CENTER

Institutional Review Board

TO: H.M. Evans, PhD
Psychology – EP A.132

FROM: *Anne Clark*
David Karp, MD, PhD
Institutional Review Board 1 Chairperson
IRB - 8843

DATE: April 23, 2007

RE: **Registration Off-Site Research**
IRB Number: 042007-048
Title: The Experience of Being Hospitalized During Pregnancy

The UT Southwestern Institutional Review Board has reviewed the above referenced study and accepts the approval issued by Baylor University Medical Center. The study has been assigned a UT Southwestern IRB Number of 042007-048. Registration of this off-site research is effective until April 22, 2008

If the research continues beyond April 22, 2008, the Principal Investigator is responsible for providing the UT Southwestern IRB with evidence of the continuing review approval of the Baylor University Medical Center.

Please notify the UT Southwestern IRB if serious safety concerns or other problems should result in suspension or termination of approval of this study at Baylor University Medical Center.

If you have any questions related to this communication or the UT Southwestern IRB, you may telephone Anne Clark at 214-648-3691.

DK/ac

REFERENCES

Ainsworth, M. D. (1963). The development of infant-mother interaction among

the Ganda. In Tavistock Study Group on Mother-Infant Interaction (Ed.),

Determinants of infant behaviour (pp. 67-104). London: Methuen.

Ainsworth, M. D. S., & Bell, S. M. (1970). Attachment, exploration, and

separation: Illustrated by the behavior of one-year-olds in a strange

situation. *Child Development, 41*, 49-67.

Ainsworth, M. D. S., Bell, S. M. V., & Stayton, D. J. (1971). Individual

differences in strange-situation behaviour of one-year-olds. In H. R.

Schaffer (Ed.), *The origins of human social relations* (pp. 17-58). London

and New York: Academic Press.

Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of

attachment*. Hillsdale, New Jersey: Lawrence Erlbaum Associates, Inc.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of

mental disorders* (4th ed., text revision). Washington, DC: Author.

Austin, M., & Lumley, J. (2003). Antenatal screening for postnatal depression: A

systematic review. *Acta Psychiatrica Scandinavica, 107*(1), 10-17.

Bacak, S. J., Callaghan, W. M., Dietz, P. M., & Crouse, C. (2005). Pregnancy-

associated hospitalizations in the United States, 1999-2000. *American

Journal of Obstetrics & Gynecology, 192*(2), 592-597.

Barcley, S., & Ziehm, D. J. (1977). Development of the "maternal role". *Arizona Medicine, 34*(3), 168-170.

Barnett, B., & Parker, G. (1986). Possible determinants, correlates and consequences of high levels of anxiety in primiparous mothers. *Psychological Medicine, 16*(1), 177-185.

Barnett, B., Schaafsma, M., Gusman, A., & Parker, G. (1991). Maternal anxiety: A 5-year review of an intervention study. *Journal of Child Psychology and Psychiatry, 32*(3), 423-438.

Beck, C. T. (1998). The effects of postpartum depression on child development: A meta-analysis. *Archives of Psychiatric Nursing, 12*(1), 12-20.

Beck, C. T. (1999). Available instruments for research on prenatal attachment and adaptation to pregnancy. *MCN: The American Journal of Maternal/Child Nursing, 24*(1), 25-32.

Benoit, D., Parker, K. C., & Zeanah, C. H. (1997). Mothers' representations of their infants assessed prenatally: Stability and association with infants' attachment classifications. *Journal of Child Psychology and Psychiatry, 38*(3), 307-313.

Besser, A., Priel, B., & Wiznitzer, A. (2002). Childbearing depressive symptomatology in high-risk pregnancies: The roles of working models and social support. *Personal Relationships, 9*(4), 395-13.

Bloom, K. C. (1995). The development of attachment behaviors in pregnant

adolescents. *Nursing Research, 44*(5), 284-289.

Blumberg, N. L. (1980). Effects of neonatal risk, maternal attitude, and cognitive

style on early postpartum adjustment. *Journal of Abnormal Psychology,*

89(2), 139-150.

Bowlby, J. (1944). Forty-four juvenile thieves: their characters and home-life (II).

International Journal of Psycho-Analysis 25 1944, 107-128.

Bowlby, J. (1969). *Attachment and loss, volume I: Attachment.* New York: Basic

Books, Inc.

Bowlby, J. (1973). *Attachment and loss, volume II: Separation: Anxiety and*

anger. New York: Basic Books, Inc.

Bowlby, J. (1980). *Attachment and loss, volume III: Loss: Sadness and*

depression. New York: Basic Books, Inc.

Bretherton, I. (1985). Attachment theory: Retrospect and prospect. *Monographs*

of the Society for Research in Child Development, 50(1-2), 3-35.

Bretherton, I. (1992). The origins of attachment theory: John Bowlby and Mary

Ainsworth. *Developmental Psychology, 28*(5), 759-775.

Britton, J. R. (2005). Pre-discharge anxiety among mothers of well newborns:

prevalence and correlates.[see comment]. *Acta Paediatrica, 94*(12), 1771-

1776.

Cannella, B. L. (2005). Maternal-fetal attachment: An integrative review. *JAN Journal of Advanced Nursing, 50*(1), 60-68.

Carson, K., & Virden, S. (1984). Can prenatal teaching promote maternal attachment? Practicing nurses test Carter-Jessop's prenatal attachment intervention. *Health Care for Women International, 5*(5-6), 355-369.

Carter-Jessop, L. (1981). Promoting maternal attachment through prenatal intervention. *MCN, American Journal of Maternal Child Nursing, 6*(2), 107-112.

Condon, J. T. (1987). Psychological and physical symptoms during pregnancy: A comparison of male and female expectant parents. *Journal of Reproductive and Infant Psychology, 5*(4), 207-219.

Condon, J. T. (1993). The assessment of antenatal emotional attachment: Development of a questionnaire instrument. *British Journal of Medical Psychology, 66*(2), 167-183.

Condon, J. T., & Corkindale, C. J. (1997). The assessment of depression in the postnatal period: A comparison of four self-report questionnaires. *Australian and New Zealand Journal of Psychiatry, 31*(3), 353-359.

Cox, J., Holden, J., & Sagovsky, R. (1987). Detection of postnatal depression: Development of the 10-item Edinburgh Postnatal Depression Scale. *British Journal of Psychiatry Vol 150 Jun 1987, 782-786.*

Cranley, M. S. (1979). *The impact of perceived stress and social support on maternal-fetal attachment in the third trimester.* Unpublished Dissertation, University of Wisconsin, Madison, WI.

Cranley, M. S. (1981a). Development of a tool for the measurement of maternal attachment during pregnancy. *Nursing Research, 30*(5), 281-284.

Cranley, M. S. (1981b). Roots of attachment: the relationship of parents with their unborn. *Birth Defects: Original Article Series, 17*(6), 59-83.

Cranley, M. S. (1984). Social support as a factor in the development of parents' attachment to their unborn. *Birth Defects: Original Article Series, 20*(5), 99-124.

Cummings, E. M., & Davies, P. T. (1994). Maternal depression and child development. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 35*(1), 73-112.

Curry, M. A. (1987). Maternal behavior of hospitalized pregnant women. *Journal of Psychosomatic Obstetrics & Gynecology, 7*(3), 165-182.

Doan, H. M., & Zimerman, A. (2003). Conceptualizing prenatal attachment: Toward a multidimensional view. *Journal of Prenatal & Perinatal Psychology & Health, 18*(2), 109-129.

Dyer, E. D. (1963). Parenthood as crisis: A re-study. *Marriage and Family Living, 25(2), 196-201*.

Engle, P. L., Scrimshaw, S. C., Zambrana, R. E., & Dunkel-Schetter, C. (1990). Prenatal and postnatal anxiety in Mexican women giving birth in Los Angeles. *Health Psychology, 9*(3), 285-299.

Finer, L. B., & Henshaw, S. K. (2006). Disparities in rates of unintended pregnancy in the United States, 1994 and 2001. *Perspectives on Sexual & Reproductive Health, 38*(2), 90-96.

Fonagy, P. (2001). *Attachment theory and psychoanalysis*. New York: Other Press.

Fonagy, P., Steele, H., & Steele, M. (1991). Maternal representations of attachment during pregnancy predict the organization of infant-mother attachment at one year of age. *Child Development, 62*(5), 891-905.

Fowles, E. R. (1996). Relationships among prenatal maternal attachment, presence of postnatal depressive symptoms, and maternal role attainment. *Journal of the Society of Pediatric Nurses, 1*(2), 75-82.

Fuller, J. R. (1990). Early patterns of maternal attachment. *Health Care for Women International, 11*(4), 433-446.

Fuller, S. G., Moore, L. R., & Lester, J. W. (1993). Influence of family functioning on maternal-fetal attachment. *Journal of Perinatology, 13*(6), 453-460.

Gaffney, K. F. (1986). Maternal-fetal attachment in relation to self-concept and anxiety. *Maternal-Child Nursing Journal, 15*(2), 91-101.

Gaynes, B. N., Gavin, N., Meltzer-Brody, S., Lohr, K. N., Swinson, T., Gartlehner, G., Brody, S., & Miller, W. C. (2005). Perinatal depression: prevalence, screening accuracy, and screening outcomes. *Evidence Report: Technology Assessment (Summary)* (119), 1-8.

Goto, A., Yasumura, S., Yabe, J., & Reich, M. R. (2006). Addressing Japan's fertility decline: influences of unintended pregnancy on child rearing. *Reproductive Health Matters, 14*(27), 191-200.

Graham, J. M., Yiu, Y. J., Jeziorski, J. L. (2006). The Dyadic Adjustment Scale: A reliability generalization meta-analysis. *Journal of Marriage and Family, 68*(3), 701-717.

Henshaw, S. K. (1998). Unintended pregnancy in the United States. *Family Planning Perspectives, 30*(1), 24-29.

Heron, J., O'Connor, T. G., Evans, J., Golding, J., & Glover, V. (2004). The course of anxiety and depression through pregnancy and the postpartum in a community sample. *Journal of Affective Disorders, 80*(1), 65-73.

Heyman, R. E., Sayers, S. L., & Bellack, A. S. (1994). Global marital satisfaction versus marital adjustment: An empirical comparison of three measures. *Journal of Family Psychology, 8*(4), 432-446.

Kemp, V. H., & Page, C. K. (1987a). Maternal prenatal attachment in normal and high-risk pregnancies. *JOGNN - Journal of Obstetric, Gynecologic, & Neonatal Nursing, 16*(3), 179-184.

Kemp, V. H., & Page, C. K. (1987b). Maternal self-esteem and prenatal attachment in high-risk pregnancy. *Maternal-Child Nursing Journal, 16*(3), 195-206.

Kent, L., Laidlaw, J. D. D., & Brockington, I. F. (1997). Fetal abuse. *Child Abuse & Neglect, 21*(2), 181-186.

Kero, A., & Lalos, A. (2000). Ambivalence--a logical response to legal abortion: a prospective study among women and men. *Journal of Psychosomatic Obstetrics & Gynecology, 21*(2), 81-91.

Klaus, M. H. & Kennell, J. H. (1982). *Parent-Infant Bonding, Second Edition.* St. Louis, MO: The C. V. Mosby Company.

Kost, K., Landry, D. J., & Darroch, J. E. (1998). The effects of pregnancy planning status on birth outcomes and infant care. *Family Planning Perspectives, 30*(5), 223-230.

Laxton-Kane, M., & Slade, P. (2002). The role of maternal prenatal attachment in a woman's experience of pregnancy and implications for the process of care. *Journal of Reproductive and Infant Psychology, 20*(4), 253-266.

Leichtentritt, R. D., Blumenthal, N., Elyassi, A., & Rotmensch, S. (2005). High-Risk Pregnancy and Hospitalization: The Women's Voice. *Health & Social Work, 30*(1), 39-47.

Leifer, M. (1977). Psychological changes accompanying pregnancy and motherhood. *Genetic Psychology Monographs, 95*(1), 55-96.

LeMasters, E. E. (1957). Parenthood as crisis. *Marriage and Family Living, 19*(4), 352-355.

Lumley, J. (1990). Through a glass darkly: ultrasound and prenatal bonding. *Birth, 17*(4), 214-217.

Lumley, J. M. (1982). Attitudes to the fetus among primigravidae. *Australian Paediatric Journal, 18*(2), 106-109.

Mallikarjun, P. K., & Oyebode, F. (2005). Prevention of postnatal depression. *Journal of the Royal Society of Health, 125*(5), 221-226.

Maloni, J. A., Kane, J. H., Suen, L.-J., & Wang, K. K. (2002). Dysphoria among high-risk pregnant hospitalized women on bed rest: A longitudinal study. *Nursing Research, 51*(2), 92-99.

McCabe, M. P., Cummins, R. A., & Romeo, Y. (1996). Relationship status, relationship quality, and health. *Journal of Family Studies, 2*(2), 109-120.

Mercer, R. T., Ferketich, S., May, K., DeJoseph, J., & Sollid, D. (1988). Further exploration of maternal and paternal fetal attachment. *Research in Nursing & Health, 11*(2), 83-95.

Mercer, R. T., & Ferketich, S. L. (1994). Predictors of maternal role competence by risk status. *Nursing Research, 43*(1), 38-43.

Mikhail, M. S., Freda, M. C., Merkatz, R. B., Polizzotto, R., Mazloom, E., & Merkatz, I. R. (1991). The effect of fetal movement counting on maternal

attachment to fetus. *American Journal of Obstetrics & Gynecology, 165*(4 Pt 1), 988-991.

Muller, M. E. (1992). A critical review of prenatal attachment research. *Scholarly Inquiry for Nursing Practice, 6*(1), 5-22.

Muller, M. E. (1993). Development of the prenatal attachment inventory. *Western Journal of Nursing Research, 15*(2), 199-215.

Muller, M. E. (1994). A questionnaire to measure mother-to-infant attachment. *Journal of Nursing Measurement, 2*(2), 129-141.

Muller, M. E. (1996). Prenatal and postnatal attachment: a modest correlation. *JOGNN - Journal of Obstetric, Gynecologic, & Neonatal Nursing, 25*(2), 161-166.

National Institute of Child Health and Human Development Early Child Care Research Network. (1999). Chronicity of maternal depressive symptoms, maternal sensitivity, and child functioning at 36 months. *Developmental Psychology, 35*(5), 1297-1310.

O'Connor, T. G., Heron, J., Glover, V., and the ALSPAC Study Team. (2002). Antenatal anxiety predicts child behavioral/emotional problems independently of postnatal depression. *Journal of the American Academy of Child & Adolescent Psychiatry, 41*(12), 1470-1477.

O'Dowd, M. J. & O'Dowd, T. M. (1985). Quickening—a re-evaluation. *British Journal of Obstetrics and Gynaecology, 92*(10), 1037-1039.

Owen, M. T., & Cox, M. J. (1997). Marital conflict and the development of infant-parent attachment relationships. *Journal of Family Psychology, 11*(2), 152-164.

Penticuff, J. H. (1982). Psychologic implications in high-risk pregnancy. *Nursing Clinics of North America, 17*(1), 69-78.

Pihet, S., Bodenmann, G., Cina, A., Widmer, K., & Shantinath, S. (2007). Can prevention of marital distress improve well-being? A 1 year longitudinal study. *Clinical Psychology and Psychotherapy, 14*(2), 79-88.

Pollock, P. H., & Percy, A. (1999). Maternal antenatal attachment style and potential fetal abuse. *Child Abuse & Neglect, 23*(12), 1345-1357.

Porter, L. S., & Demeuth, B. R. (1979). The impact of marital adjustment on pregnancy acceptance. *Maternal-Child Nursing Journal, 8*(2), 103-113.

Priel, B., & Besser, A. (1999). Vulnerability to postpartum depressive symptomatology: Dependency, self-criticism and the moderating role of antenatal attachment. *Journal of Social & Clinical Psychology, 18*(2), 240-253.

Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*(3), 385-401.

Richardson, P. (1983). Women's perceptions of change in relationships shared with their husbands during pregnancy. *Maternal-Child Nursing Journal, 12*(1), 1-19.

Rubin, R. (1967). Attainment of the Maternal Role: Ii. Models and Referrants. *Nursing Research 16(4) 1967, 342-346.*

Rubin, R. (1975). Maternal tasks in pregnancy. *Maternal-Child Nursing Journal, 4*(3), 143-153.

Scott, C. L., Chavez, G. F., Atrash, H. K., Taylor, D. J., Shah, R. S., Rowley, D., et al. (1997). Hospitalizations for severe complications of pregnancy, 1987-1992. *Obstetrics & Gynecology, 90*(2), 225-229.

Siddiqui, A., & Hagglof, B. (2000). Does maternal prenatal attachment predict postnatal mother-infant interaction? *Early Human Development, 59*(1), 13-25.

Snowden, L. R., Schott, T. L., Awalt, S. J., & Gillis-Knox, J. (1988). Marital satisfaction in pregnancy: Stability and change. *Journal of Marriage & the Family, 50*(2), 325-333.

Spanier, G. B. (1976). Measuring dyadic adjustment: New scales for assessing the quality of marriage and similar dyads. *Journal of Marriage & the Family, 38*(1), 15-28.

Spanier, G. B. (2001). Dyadic Adjustment Scale User's Manual. Multi-Health Systems Inc.

Spielberger, C. D., Gorsuch, R. L., Lushene, R. E., Vagg, P. R., & Jacobs, G. A. (1970). The State-Trait Anxiety Inventory: STAI. Palo Alto, CA: Consulting Psychologist Press.

Stainton, M., McNeil, D., & Harvey, S. (1992). Maternal tasks of uncertain motherhood. *Maternal-Child Nursing Journal, 20*(3-4), 113-123.

Stuart, S., Couser, G., Schilder, K., O'Hara, M., & Gorman, L. (1998). Postpartum anxiety and depression: Onset and comorbidity in a community sample. *Journal of Nervous and Mental Disease, 186*(7), 420-424.

Tietjen, A. M., & Bradley, C. F. (1985). Social support and maternal psychosocial adjustment during the transition to parenthood. *Canadian Journal of Behavioural Science, 17*(2), 109-121.

U. S. Census Bureau. (2005). *General demographic characteristics for Dallas County, Texas, 2005 American community survey.* Retrieved May 10, 2007, from http://www.nctcog.org/ris/census/acs05/w1.asp?Geo= County&Area=113

Verdoux, H., Sutter, A. L., Glatigny-Dallay, E., & Minisini, A. (2002). Obstetrical complications and the development of postpartum depressive symptoms: a prospective survey of the MATQUID cohort. *Acta Psychiatrica Scandinavica, 106*(3), 212-219.

Verny, T., & Kelly, J. (1981). *The Secret Life of the Unborn Child.* New York: Dell Publishing.

Wayland, J., & Tate, S. (1993). Maternal-fetal attachment and perceived

    relationships with important others in adolescents. *Birth, 20*(4), 198-203.

Wenzel, A., Haugen, E. N., Jackson, L. C., & Brendle, J. R. (2005). Anxiety

    symptoms and disorders at eight weeks postpartum. *Journal of Anxiety

    Disorders, 19*(3), 295-311.

Wenzel, A., Haugen, E. N., Jackson, L. C., & Robinson, K. (2003). Prevalence of

    generalized anxiety at eight weeks postpartum. *Archives of Women's

    Mental Health, 6*(1), 43-49.

White, M., & Ritchie, J. (1984). Psychological stressors in antepartum

    hospitalization: reports from pregnant women. *Maternal-Child Nursing

    Journal, 13*(1), 47-56.

Williams, M. L. (1986). Long-term hospitalization of women with high-risk

    pregnancies. A nurse's viewpoint. *JOGNN - Journal of Obstetric,

    Gynecologic, & Neonatal Nursing, 15*(1), 17-21.

Wilson, M. E., White, M. A., Cobb, B., Curry, R., Greene, D., & Popovich, D.

    (2000). Family dynamics, parental-fetal attachment and infant

    temperament. *Journal of Advanced Nursing, 31*(1), 204-210.

Zachariah, R. (1994a). Maternal-fetal attachment: influence of mother-daughter

    and husband-wife relationships. *Research in Nursing & Health, 17*(1), 37-

    44.

Zachariah, R. (1994b). Mother-daughter and husband-wife attachment as

    predictors of psychological well-being during pregnancy. *Clinical Nursing*

    Research, 3(4), 371-392.

Zachariah, R. (2004). Attachment, Social Support, Life Stress, and Psychological

    Well-Being in Pregnant Low-Income Women: A Pilot Study. *Clinical*

    Excellence for Nurse Practitioners, 8(2), 60-62.

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