ATTACHMENT STYLE, DEPRESSION, AND HEALTH OUTCOMES AMONG
ANTEPARTUM PATIENTS

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DEDICATION

To my father, whose unwavering belief in knowledge and education has made my pursuits

possible.

To my mother, whose wisdom and nurturance has lead to my personal growth and

development.

"Oh, my friends, that your self be in your deed as the mother is in her child."

-Friedrich Nietzsche, *Thus Spoke Zarathustra*

"People always regret that the past is so final, that nothing can change it – but I'm glad it's

so. We can't spoil it."

-Ayn Rand, *The Fountainhead*

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ANTEPARTUM PATIENTS

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, 2015

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Publication No. _____

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The University of Texas Southwestern Medical Center at Dallas, 2015

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Clear evidence of the impact of psychosocial factors on healthcare utilization continues to grow. An individual's attachment style is hypothesized to be one such important psychosocial factor related to healthcare utilization. Women with high-risk pregnancies treated in antepartum units have been shown to experience higher levels of stress than the general population, which has been hypothesized to activate adaptive and maladaptive patterns of interpersonal relationships. Therefore, the present study investigated the relationship among attachment style, stress, depression, and healthcare utilization in a sample of women with high-risk pregnancies. Stress and depressive symptoms were hypothesized to serve as moderating variables between patients' attachment styles and their healthcare utilization. To the author's knowledge, this was the first study to examine the role of stress in this manner. One hundred seventeen participants from the antepartum unit of Baylor University Medical Center were enrolled. Participants were administered a demographic questionnaire, the Edinburgh Postpartum Depression Scale, the Experiences in Close Relationships Scale – Short Form, the Attachment Style Questionnaire, the Crowne-Marlowe Social Desirability Scale, and the Perceived Stress Scale. Healthcare utilization data was then collected from participants' electronic medical records. Regression analyses determined that while an insecure attachment style was associated with increased depressive symptoms, the strongest association with depressive symptomatology was subjective stress levels ($b = .813$, $t = 11.54$, $p < .001$). Thus, while the moderator analysis was significant overall, stress was most closely associated with depressive symptoms. With regard to healthcare utilization, a MANOVA revealed no association between attachment style and healthcare utilization, although it did reveal that stress scores were significantly associated with emergency room visits in the past twelve months ($F(1, 103) = 11.48$, $p < .001$, partial $\eta^2 = .093$) as well as with pain scores ($F(1, 103) = 5.19$, $p = .025$, partial $\eta^2 = .044$). Thus, although attachment style is related to depression, stress was found to be more strongly associated with depression and several healthcare variables. Further research is warranted to examine the role that attachment style may play in depressive symptoms and healthcare utilization.

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PRIOR PUBLICATIONS

Cassedy, H. F., Enander, R. A., Robinson, R. C., Frank, B., Evans, H. M., Tucker, C., Miltenberger, P. D., Pitts, S. & Stringer, C. A. (in press). Attachment theory as a model of doctor-patient interaction. *Journal of Applied Biobehavioral Research*.

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Antepartum – period of gestation – synonymous with *antenatal*; see also *prenatal.*

Attachment theory – the study of the dynamics of long-term interpersonal relationships.

Eclampsia – seizures in pregnant women that are not the result of a pre-existing brain condition.

Imprinting – involuntary phase-sensitive learning.

Insecure attachment – a pattern of attachment that describes either children or adults who have either a relatively avoidant (dismissive) or ambivalent (preoccupied) relationship with their attachment figure.

Internal working model – a set of views that shapes the ways in which people formulate their understanding of the world and relationships.

Major Depressive Disorder – a type of mood disorder characterized by one or more major depressive episodes. The Diagnostic and Statistical Manual version 5 (DSM-5), defines a major depressive episode as: a period of at least 2 weeks during which an individual experiences daily disturbance in mood in the form of sadness, or loss of interest in activities that have been pleasurable in the past, and at least four of the following seven symptoms: 1) hypersomnia or hyposomnia, 2) changes in appetite or weight, 3) psychomotor agitation or retardation, 4) loss of energy, 5) feelings of worthlessness or excessive guilt, 6) problems with concentration, and 7) recurrent suicidal thoughts or suicidal attempt. These symptoms must be present most of the day and nearly every day during the two week episode, must cause clinically significant distress or impairment in functioning, and must not be the result of the direct physiologic effects of a substance or a general medical condition.

Perinatal – period of time beginning at pregnancy and ending 12 months after birth.

Postpartum – period of time beginning at parturition and ending 12 months after birth.

Prenatal – period of pregnancy that starts at conception and end at parturition.

Previa – a complication of pregnancy that occurs when the fetal placenta partially or completely occludes the opening in a mother's cervix.

Safe haven – concept that describes how a child returns to a caretaker after being frightened.

Secure attachment – a pattern of attachment that describes either children or adults who have a relatively unambivalent relationship with their attachment figure.

Secure base – how a child perceives a caregiver in order to explore their environment.

Sensitivity – the degree to which a measure correctly identifies those it is intended to measure. It is calculated by comparing the measured true positives to the false negatives.

Specificity – the degree to which a measure correctly excludes those who should not measured. It is calculated by comparing the measured true negatives to the false positives.

Stress – a subjective state of emotional tension resulting from unpredictable or uncontrollable mental overload.

Validity – the extent to which a measure accurately measures that which is intended.

CHAPTER ONE
Introduction

Since the early 20th century, researchers have concerned themselves with the mother-child relationship. John Bowlby, the first attachment theorist, proposed the then revolutionary idea that a child's interactions with his mother (as opposed to his inner fantasies) could have a lasting impact upon that child's psychological life (Brandon, 2006). Over the years his attachment theory would grow and develop, eventually shaping the landscape of how many psychologists today view not only mother-child interactions, but a host of other interpersonal relationships as well.

The notion of attachment has grown towards a conceptualization that encompasses domains that Bowlby and other early researchers would likely not have foreseen. For example, some contemporaries of attachment theory now argue that the bonds of attachment begin to take hold earlier than previously suspected – that they find their origin in utero (Cranley, 1979). Furthermore, attachment styles have been studied in other domains as well, such as the military, in healthcare settings, and the workplace (Manning, 2003; Zakin, Solomon, & Neria, 2003; Ciechanowski et al., 2004). However, this extensive and expanding area of research still contains many yet unanswered questions. If we are able to characterize the attachment style of an individual, what then? Might it be possible to describe relationships between such attachment styles and other psychological phenomena? And equally importantly, might it be possible that these attachment styles are also correlated with physical health outcomes as well?

Furthermore, recent research has begun to demonstrate the role of attachment in pregnant populations. Antepartum complications are many and may result in increased maternal stress. This period of great stress has been shown to activate a mother's attachment style (Mikulincer, Birnbaum, Woddis, & Nachmias, 2000). Through a better understanding of maternal attachment styles, we may better serve this population as we begin to understand how they proceed to utilize healthcare. Research has demonstrated that attachment styles affect how patients form patient-provider relationships and adhere to treatment plans, which ultimately contribute to medical outcomes (Ahrens, Ciechanowski, & Katon, 2012; Hunter & Maunder, 2001).

The present study wished to examine pregnant mother's attachment styles. The study included two overarching aims:

First, this study sought to examine the prevalence of attachment styles and their relationship with depressive symptoms in an inpatient medical setting.

Second, the author wished to examine the relationship between attachment style and various physical health outcomes, such as hospital length of stay, medication utilization, and indices of health. Before conducting this investigation, however, it was necessary to first examine the current understanding of attachment theory, and how the research community has come this far.

PURPOSE OF THE STUDY

The study of attachment is an expanding field that has seen tremendous growth since the days of John Bowlby and Mary Ainsworth. Research since then has shown that adult attachment styles are significantly correlated with physical and psychological outcomes (Siegel, 2012). Furthermore, the adult attachment styles of secure, preoccupied, and dismissing, may serve as a template for how adults relate to others (Sroufe, 2005). The role of attachment on interpersonal relationships is well documented, and research has begun to demonstrate further implications for physical health, i.e. via cortisol regulation (Dickerson & Kemeny, 2004; Sapolsky, 2004) and oxytocin levels (Feldman, Gordon, & Zagoory-Sharon, 2010; Tops, Van Peer, Korf, Wijers, & Tucker, 2007; Uchino, 2006).

Despite these advances, gaps continue to persist in the literature. Specifically, limited research has been conducted within medical settings to determine the relationship that attachment style may have with measureable health outcomes. Recent research has, however, addressed prenatal depression and attachment (Keller, 2009), as well as prenatal attachment and personality (Brandon, 2006). The current study wished to build upon this research, and continue to investigate adult attachment, depression, and measureable health outcomes in a prenatal population. This study sought to investigate antepartum inpatients at a local hospital in an attempt to better understand the effects of attachment styles on health-related outcomes.

Attachment styles were assessed with Hazan and Shaver's Attachment Styles Measure (1987) and with the Experiences in Close Relationships – Short Form (Wei et

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al., 2007). Furthermore, as these measures are self-report and largely face valid, patients were also administered the Crowne and Marlowe Social Desirability Scale (1960) to assess the extent to which patients might "fake good" i.e. falsely report secure attachment. Some individuals may have attempted to portray themselves in a favorable manner and wanted to depict themselves as similar to the norms and standards of society. The purpose of including the Social Desirability Scale was to identify such individuals, as they may have been prone towards inaccurately reporting their attachment style. To the best of my knowledge, this was the first time social desirability of attachment has been taken into account in a medical setting. The author felt that this measure would contribute increased self-report validity to the current study, as the investigators would have been able to utilize this measure as a covariate in examining the data set, accounting for those patients who falsely report secure attachment.

CHAPTER TWO
Review of the Literature

A HISTORY OF ATTACHMENT THEORY

Beginning with Bowlby

The study of attachment theory begins with noted British childcare volunteer-turned psychiatrist, John Bowlby. During his studies, he noted that children who suffered from maternal deprivation became markedly despondent and quite unresponsive. Struck by these observations, Bowlby hypothesized that children had a psychological need to "attach" to a primary caregiver for emotional comfort. Children that were unable to do so were at risk for future emotional dysregulation and interpersonal difficulties (Karen, 1998). This conceptualization was a rather large departure from the limited Freudian notion of early mother-child relationships. Freud believed that the infant became attached to the mother's breast primarily as a function of the need for biological nourishment (Freud, 1964). Although later psychoanalytic theorists would expand their understanding of attachment from gratification seeking to object seeking, Bowlby provided an alternative conceptualization. Under his model, attachment was the means by which mothers were able to successfully (or not) emotionally attune to their children. This line of thinking would prove to separate him from his contemporary psychoanalysts (Brandon, 2006). Bowlby would also distance himself from the other major psychoanalytic figure of his time, Melanie Klein. While his supervisor at the British Psychoanalytic Institute, Klein attempted to persuade Bowlby that children's emotional problems stemmed from their subjective perception of the world, which may have

nothing to do with the external environment. Bowlby, however, maintained that objective reality was of greater importance. Under her supervision, Klein once famously forbade Bowlby from meeting with the mother of one of his three year-old patients, as she did not believe the parent's involvement to be important to the treatment of the child (Bretherton, 1992). Bowlby, however, believing that parents with insecure attachment are more likely to bear children with insecure attachment, wished to help his child patient through further working with the parent (Karen, 1998). This act created a rift that would later exist between Bowlby and Klein throughout their respective careers.

Bowlby's research on mother-child relationships led to his defining of two key concepts in attachment theory. The first was the notion of a "secure base" – as children are able to internalize their caregiver, they are able to explore their environment with increased security. Here, children gain the confidence needed to navigate settings that might be farther away from their parents. This fosters cognitive and emotional growth, as the children are able to explore their surroundings with an increased sense of self-reliance.   Secondly, children come to view their caregiver as a "safe haven." When the child feels threatened or scared, they are able to return to the caregiver as a source of both physical protection and emotional comfort (Bowlby, 1969).

Robertson's Filmmaking

In 1948, Bowlby hired a social worker to help observe institutionalized children. James Robertson had been previously employed by Anna Freud as a worker in her Hampstead Wartime Nursery. There, he gained experience in child behavior observation

and became a detailed note-taker (Bretherton, 1992; Karen, 1998). After joining Bowlby at the Tavistock Clinic in 1948, Robertson began championing neglected children and attempted to educate his peers on the effects that institutionalization had on this population. His efforts were often met with criticism, however, and Robertson experienced much disbelief at his reported findings. In an attempt to exert greater influence on the psychological community, Robertson collaborated with Bowlby to create the film *A Two-Year-Old Goes to Hospital* (Robertson, 1953). The movie depicted a randomly selected child from the hospital, chronicling her despair and isolation. As a result of this film, psychologists became increasingly aware of child attachment, and significant changes were made to child ward conditions as a result.

Bowlby & The World Health Organization

In 1951, Bowlby was commissioned to write a report on homeless children to the World Health Organization (WHO). In his report, he noted that a child's mental health was dependent upon having a mutually satisfying, continuous relationship with the mother. He also concluded that society ought to provide opportunities for parents so that they may adequately care for their children (Bowlby, 1951). His findings were widely influential at the time, resulting in changes at the institutional level. For example, some hospitals began to allow for more visitation time by parents. Culturally, Bowlby had contributed to a shift in how people began to think about parenting and the ways in which they interact with their children (Bretherton, 1992).

The findings of Bowlby's WHO report were not without controversy, however. In publishing his report, Bowlby had divisively opposed a large segment of classical psychoanalysis, in particular the Kleinian camp. In Melanie Klein's view, the child's perception of his parents (especially the mother) was all important – the objective reality of a parent needing to spend more time with their child was antithetical to her notion of attachment. Still others criticized Bowlby's work and ability to generalize his findings. It was argued that the homeless, parent-less children that Bowlby studied had suffered from *privation*, or a lack of an attachment figure, and that these findings should not be generalized to account for *deprivation*, or the loss/under stimulation of an attachment figure (Rutter, 1981).

Though likely well intentioned, many felt that the social implications of Bowlby's research would have deleterious effects on women. The idea that mothers needed to spend more time with their children in essence, it was argued, meant less time at work and more time in the home. With the publication of *Deprivation of maternal care: A Reassessment of its Effects* (Ainsworth, Andry, Harlow, Lebovici, Mead, Prugh, & Wootton, 1962), the WHO seemed to once again seemed to re-emphasize the need for maternal time spent with children, much to the dismay of Klein and others.

Other Influences

During the course of his research, Bowlby developed an interest in possible biological, embryonic origins to support his growing attachment theory. It was during this time that he encountered the works of Konrad Lorenz (Van der Horst, Van der Veer,

& Van Ijzendoorn, 2007). Lorenz was an ethologist whose seminal work with geese would have far reaching effects across a range of disciplines. He would become best well-known for his research on baby geese. Lorenz discovered a process termed "imprinting" whereby geese would attach to the first suitable object they encountered during a critical time period after hatching (Lorenz, 1936). The concept of imprinting was later generalized to include any learning that occurs during a biological, species-specific amount of time. The idea of imprinting during a "critical period" was of great interest to Bowlby, as it appeared to be a biologically scientific correlate to psychological attachment as he had heretofore studied (Karen, 1998). Additionally, the concept of imprinting seemed to further separate Bowlby from Kleinian and Freudian notions of attachment. With imprinting, the infants did not attach to their mothers simply for her breast as a source of nourishment, nor did they do so out of some drive for oral gratification. Rather, the ethological approach to imprinting provided Bowlby with an additional means to conceptualize attachment as a modality in its own right (Bretherton, 1992; Brandon, 2006).

Bowlby would find increased support for his attachment theory in the works of psychologist Harry Harlow. In 1958, Harlow had been studying baby rhesus monkeys that were separated from their mothers shortly after birth. He was surprised to find that although they were kept in a sterile environment and fed adequately, these infant monkeys struggled to survive more than five days when kept in a wire cage (Harlow & Zimmerman, 1958b). However, in the case of some monkeys, folded gauze had lined the

bottoms of their cages, and these monkeys clung to their cloth pads, and interestingly seemed to live longer (Karen, 1998).

Harlow's views were similar to Bowlby's, in that he rejected the psychoanalytic notion of babies loving their mothers solely for provided nourishment. He decided to run an experiment to test his hypothesis using his separated rhesus monkeys. He raised his monkeys in cages that consisted of two contraptions he termed "surrogate mothers." One of the "mothers" was essentially a block of wood wrapped in terry cloth with a small face; the other "mother" was nearly identical, except that it was constructed of wire mesh and lacked cloth lining. For half of the monkeys, the terry cloth mother was fitted with a feeding nipple, for the other half, the nipple was attached to the wire mesh mother (Karen, 1998). In both subject groups, however, the results were the same. Regardless of where the monkey had fed, the infant would always spend the majority of its time clinging to the terry cloth mother (Harlow, 1958a). Even when fed by the wire mother, the monkeys would run to the cloth mother when frightened, effectively using it as a *safe haven*. Additionally, when placed in a playroom with toys available to them, monkeys that had their terry cloth mothers available (*secure base*) were more likely to venture out and explore their environment (Harlow, 1958b). All of these findings served as encouragement for Bowlby, who continued to explore the mother-child attachment dyad.

Bowlby would continue to create more distance between himself and the rest of the psychoanalytic world with his developing theory of attachment. He would release "Grief and mourning in infancy and early childhood" (Bowlby, 1960) wherein he argued that infants are not capable of true mourning due to insufficient ego development.

Instead, he stated that what resulted was a brief period of separation anxiety, so long as

an appropriate substitute was available to replace the attachment object. He argued that if

this process occurred repeatedly, the developing child would struggle to form close

interpersonal relationships and the result would be a poor attachment style (Bowlby,

1960).

Enter Mary Ainsworth

The paths of Mary Ainsworth and Bowlby had crossed in 1950. Ainsworth joined

Bowlby's research team and began to analyze Robertson's data. Ainsworth had

demonstrated significant interest in studying mother-child relationships. She departed

from Bowlby's Tavistock clinic in 1953 to relocate to Uganda, where her husband had

obtained a research position in social psychology. While there, she began to gather

observational data on the infant-mother attachment relationship. Employing an

interpreter, Ainsworth worked with 26 families, wherein she would observe mother-

infant interactions in segments lasting several hours. These periods of observation

occurred every two weeks and persisted for a period of up to nine months (Bretherton,

1992).

The results of Ainsworth's Uganda study bore several findings. It was noted that

the more mothers who provided the translators and observers with more spontaneous

detail about their infants were more seen as more sensitive. These sensitive mothers were

more likely to have children that were classified as having secure attachment as they

cried minimally and were content to explore their surroundings. Children of the less

sensitive mothers, by contrast, were often found to have an insecure attachment style, wherein they cried frequently and did not explore their environment as much as the securely attached infants. Lastly, there existed a group of infants that were deemed to have not yet developed an attachment style, as they did not demonstrate any differential behavior towards their mother. Lastly, Ainsworth found that a mother's enjoyment of breast-feeding also correlated with attachment style (Ainsworth, 1967).

In 1963, Ainsworth set out to build upon the findings of the Uganda attachment study. She recruited families from Baltimore and spent time observing them over the course of 18 sessions, beginning during the infant's first month of life and ending at 54 weeks of age. In a fashion similar to that of the Uganda study, each visit lasted several hours and provided observers with ample time to make observations about the nature of the mother-child interaction (Bretherton, 1992). With such significant time spent with each family, Ainsworth was able to make observations and later publish on topics such as feeding, exploration, and mother-infant body contact, among others.

Overall, there were noticeable differences in the levels of responsiveness that mothers showed to their children. For example, some mothers were able to effectively regulate the manner in which they fed their infant, whereas others struggled to correctly respond to their child's cues, resulting in the infant coughing or spitting up. Additionally, some mothers were able to align their face-to-face interactions with their children better than others. When they were able to match their child's playful behavior successfully, the infant would respond by bouncing and smiling happily. When mothers engaged their children with a more stoic expression on their face, however, their children tended to

respond with significantly less affect (Blehar, Lieberman, & Ainsworth, 1977). Similar variation occurred in the degree to which a mother let her child cry. Some mothers tended to largely ignore their child's cries for extended periods of time, and others were able to find some optimal level of attention wherein they assisted the child in being able to self-soothe (Bell & Ainsworth, 1972).

Using the same children from her Baltimore study, Ainsworth pioneered a laboratory experiment deemed the "Strange Situation" in which mother-infant dyads were observed during a 20-minute session (Ainsworth & Bell, 1970). At first, mothers would be alone with their children in a small playroom. Most of the children would wander about and play with the available toys. Then, a stranger would arrive, and most of the children would take heed of the newcomer, often halting their play (Main & Solomon, 1990). Their mothers would then leave the room, and about half of the children would begin to cry. Though some could be soothed by the stranger, many of the distressed children were only able to be comforted by their mother's eventual return (Ainsworth & Bell, 1970). In the next phase of the study, the stranger would exit the room, shortly followed by the mother. The child was now left alone in the room, and this typically caused the infant significant distress. The stranger would return and attempt to comfort the child, typically with minimal success. When the mother returned, most of the babies were able to be comforted in some meaningful way, though some of the babies appeared to ignore her altogether (Karen, 1998).

The majority (approximately 60%) of the children in the study were able to be adequately comforted upon the return of their mother. Although initially distressed, they

were able to take solace in their mother's return and would ultimately continue to play with their toys. These children were considered to be "secure" in their attachment to their mothers. Approximately 25% of the children displayed an insecure style of attachment termed "anxious-avoidant." These children appeared to be indifferent to the return of their mother, and resisted any attempts at her soothing actions. Approximately 15% of the children in the study were also insecurely attached but classified as "anxious-ambivalent." It was the case that these children struggled to make effective use of their mother's support. They would do things such as rush to their mother's side, but continue to appear distressed. Lastly, a small percentage of children would display odd behavior upon being reunited with their mothers, such as banging their head or laughing while crying. These children were categorized as displaying "disorganized" attachment (Ainsworth & Bell, 1970). Disorganization was conceptualized as a secondary type of insecure attachment, typically found in abused or neglected children. Thus, a child could be classified as anxious-avoidant, anxious-avoidant disorganized, anxious-ambivalent, or anxious-ambivalent disorganized. It should be further noted that Ainsworth's data highlighted the probabilistic nature of attachment, that is, parenting styles do not lead to a deterministic attachment outcome for their children (Bretherton, 1992).

Interestingly, one piece of information usually forgotten in the above narrative was Ainsworth's ability to predict the attachment styles of the children in her Strange Situation. Previous to this study, Ainsworth had spent time participating in a home research study in Uganda. Her experience abroad had led her to deduce a correlation between maternal activity and infant attachment (Ainsworth, 1967). Specifically,

Ainsworth hypothesized that mothers who were more emotionally attuned to their children were more likely to produce infants with secure attachment. Thus, in conducting the Strange Situation, Ainsworth found that she was often able to predict secure v. insecure attachment in an infant based upon maternal observations (Ainsworth & Bell, 1970).

The Attachment Trilogy

As Ainsworth was completing her seminal work on the Uganda, Baltimore, and Strange Situation studies, Bowlby had begun writing his highly influential trilogy on mother-child attachment. His first book, *Attachment* (1969) depicts the model of mother-infant attachment as one that regulates behavior according to various motivating factors. This line of thinking differed greatly from that of Freud's, whose theories at the time were widely regarded as "truth" amongst the psychoanalytic community. For Freud, behavior was thought to be driven by internal psychic energies and conflict between the id and superego (Freud, 1957).

In *Attachment*, Bowlby described the proximal relationship of the infant to the object of his attachment – the mother. He argued that attachment is a primary motivating force in itself, independent of feeding or other innate drives. In his proposed system, a mother seeks to nurture, guide, and protect the infant as an evolutionary necessity (Bowlby, 1969). As the infant grows in his relationship to the mother and feels increasingly safe, he is able to venture out into his environment and explore in ways not previously possible.

Bowlby's follow up to *Attachment* was *Separation*, released in 1973. Here, Bowlby argued for two separate mechanisms of action that guide child behavior: escaping from danger, and the returning to the security of an attachment figure. Although distinct concepts unto themselves, Bowlby "considers both as members of a larger family of stress-reducing and safety-promoting behavioral systems, whose more general function is that of maintaining an organism within a defined relationship to his or her environment" (Bretherton, 1992). That is, he argues that infants attempt to strike the right balance between minimizing stress, while also engaging in exploratory behavior.

An additional topic discussed in *Separation* was the child's internal working model as it relates to his attachment figure. He states that the child will develop a positive view of self if able to internalize the mother as a source of safety and comfort. If, however, the attachment object is unable to soothe the child and is unsupportive of the child's attempts at exploration, the child may come to view himself negatively (Bretherton, 1992; Brandon, 2006; Bowlby, 1973). Thus, the child's internal working model serves as an important template for a great many future interactions and is critical in shaping the self-esteem and development of the growing child. This internal working model incorporated Piaget's work, which pulled him further away from traditional psychodynamic theory (Bretherton, 1992; Brandon, 2006). It allowed researchers who did not necessarily subscribe to previous psychodynamic principles to further examine attachment theory.

In 1980 Bowlby released of *Loss*, the third and final installation in his trilogy on attachment. Much of the focus of this book lies in information-processing theory and

how it relates to a child's worldview. In particular, this volume concerns itself with how children are able to handle the loss (literal or figurative) of a mother-figure and the ensuing anxiety, grief, and depression that may follow (Bowlby, 1980). Bowlby utilizes information-processing theory to postulate that children may use defensive exclusion to drive painful stimuli out of consciousness (Bretherton, 1992). Ultimately, this may cause a split in a child's internal working model, resulting in both a positive, accepting conceptualization of an attachment figure, as well as that of a "bad" disapproving parent.

Mary Main & Adult Attachment

The field of attachment research would take a large leap forward in the 1980s. It was at this time that Mary Main, a researcher at Berkeley, proposed the existence of a new attachment style in children. In addition to the labels of secure, avoidant, and ambivalent, she also postulated that children may present with a "disorganized" attachment style (George, Kaplan, & Main, 1985). These children are thought to be overwhelmed with fear and confusion, and as such may exhibit startlingly unpredictable or inappropriate behavior such as freezing, head-banging, or jerky movement. Main would argue that although rare, disorganized attachment would result from parents who acted in a contradictory manner towards their children, acting as both figures of fear and assurance to their children (Main & Hesse, 1990).

Mary Main's attachment research would later extend beyond the realm of childhood. She argued that childhood attachment styles persisted into adulthood and affected future relationships (Cassedy et al., in press; Main, Kaplan, & Cassidy, 1985;

Main & Weston, 1981). She developed the Adult Attachment Interview (AAI), which evaluates adults' memories about their childhoods. The adults' attachment styles are then classified as "autonomous," "dismissing," "preoccupied," or "unresolved/disorganized," in a similar fashion to the childhood categories of secure, anxious-avoidant, anxious-ambivalent, and disorganized/disoriented, respectively (Cassedy et al., in press; George, Kaplan, & Main, 1985; Main & Goldwyn, 1984).

Since the work of Main, numerous other measures have been developed that have sought to identify adult attachment styles. Many of these measures, such as the Experiences in Close Relationships Scale, will be covered in detail in a later section. Overall, however, the subject of attachment has seen an explosion into other fields of interest, such as stress, psychopathology, and physical health. Attachment is no longer the sole domain of children – it has come to be studied in both the young and matured, in both outpatients and inpatients.

In recent years, statistical analysis has supported a two-dimensional model attachment (anxiety vs. avoidance). One study compiled the known self-report measures of attachment and found that factor analysis did indeed yield two global factors of anxiety and avoidance (Brennan, Clark, & Shaver, 1998). Additionally, a study conducted in 2000 utilized Item Response Theory and demonstrated the effectiveness of attachment questionnaires in measuring individuals in the high end of anxiety and avoidance (Fraley, Waller, & Brennan, 2000). Their study indicated however, that attachment measures were typically not as effective as identifying secure individuals, i.e. those rated low in anxiety and avoidance.

Criticism of Attachment Theory

Despite the enormous contributions that attachment has made to the field of psychology, the field has not been without its share of criticism. One criticism has been the categorical designation of people of into the various attachment styles. A large-scale study consisting of over one thousand infants revealed that variation in attachment patterns were continuous rather than categorical (Fraley & Spieker, 2003).

One of the most outspoken critics of attachment theory has been J. R. Harris, who contends that parents have far less influence on their children's personality and behaviors than attachment theorists might otherwise believe (Harris, 1998). Instead, she argues that a child's peers have a far greater influence. She notes that despite parents' best intention, a child reared in a crime-stricken environment is likely to succumb to peer pressure and engage in such behavior. It has also been argued that Bowlby's classic dyadic model is insufficient to adequately capture the complexity of all various interactions that contribute to a child's development (McHale, 2007).

Despite such criticism, the field of attachment theory has continued to grow in recent times. Attachment theory is now applied to many other domains that Bowlby and other early attachment theorists had likely not anticipated. The following sections will further describe the ways in which the field of attachment has grown.

Stressors Associated with Pregnant Populations

Pregnancy can be a stressful time for mothers. In addition to any previous health concerns, pregnant women may typically encounter a host of other complications, including disturbed sleep, headaches, emotional lability, and backache, to name just a few (Baeten, Bukusi, & Lambe, 2011). On the antepartum unit, patients may also be contending with gestational diabetes, eclampsia, previa, and premature contractions.

Research has demonstrated that attachment style is activated during times of stress (Mikulincer, Birnbaum, Woddis, & Nachmias, 2000; Simpson & Rholes, 1994; Simpson, Rholes & Nelligan, 1992). Furthermore, the pregnant population holds unique status amongst other inpatients in that their attachment styles are thought to be activated during this acutely stressful period during their lives (Schetter, 2011). Thus, this population could benefit from studying the associations between attachment style and various other measureable outcomes.

One of the main variables of interest in this pregnant population was depressive symptoms. It has been demonstrated that depressive symptoms are relatively common amongst pregnant women, particularly those of low socioeconomic status (Seguin, Potvin, St-Denis, & Loiselle, 1995). The associations between pregnancy and depression will be further examined in more detail below.

Prenatal Attachment

Although researchers such as Bowlby, Main, Ainsworth and other focused on early childhood attachment, there have since been others who have attempted to explore the seeds of attachment forming even earlier than this – before birth. Attachment researchers such as Deutch (1945) and Bribring (1959) argued that prenatal attachment began in the womb, wherein the mother's libidinal energy became invested in her fetus (Brandon, 2006). They further argued that as the fetus grew and became increasingly more human, the mother's love shifted from being just an extension of herself, to also incorporating love for an independent object (Bibring, Dwyer, Huntington, & Valenstein, 1961).

These early ideas of prenatal attachment were bolstered by an Australian study conducted in 1972. Mothers going through their first pregnancy were questioned at various points throughout each trimester in an attempt to understand how they conceptualized their pregnancy (Lumley, 1972). What Lumley found was that over time, pregnant women came to view their growing fetus as a "little person" (Brandon, 2006). She audio recorded her patients descriptions of their fetuses, and noted that during the first trimester, 30% of mothers would talk about their fetus as a "real person". She found that these percentages grew over time, with 63% of mothers reporting this phenomenon during the second trimester, and 92% reporting by 36 weeks gestation (Lumley, 1972).

Brandon (2006) notes that much of what is known about prenatal attachment has been passed down through nursing:

> While early formations of prenatal attachment came from the psychoanalytic approach, the study of the concept was carried on in earnest by nurses, often in

the process of graduate work. Mecca Cranley, for example, wrote the first literature review of the subject as her dissertation, proposing a multidimensional model composed of six aspects of maternal-fetal attachment she had identified from her research: Differentiation of Self from Fetus, Interaction with the Fetus, Attributing Characteristics to the Fetus, Giving of Self, Role Taking, and Nesting (Cranley, 1979). Cranley is also credited with the first formal definition of the construct of maternal-fetal attachment (MFA): "The extent to which women engage in behaviors that represent an affiliation and interaction with their unborn child" (Cranley, 1981). (p.10).

Though the current study did not wish to study the effects of prenatal attachment, the author believed that a general understanding of the construct is useful. That attachment may start even before birth is further evidence of its importance. The notion of prenatal attachment helps us better understand the population that we are working with, and may ultimately help us better serve this demographic.

DEPRESSION

Societal Burden

Research has clearly demonstrated that the societal burden associated with depression is considerable – depression has been shown to be one of the leading causes of absenteeism in the workplace (Donohue & Pincus, 2007). The World Health Organization reports that of all mental disorders, depression carries the heaviest burden as measured by disability-adjusted life years (2010). Depressive symptoms are associated with time lost from work, decreased productivity, and increased healthcare expenditures. Genetic causes have been hypothesized, though the exact etiology of the disorder remains unknown (Jardine, Martin, Henderson, & Rao, 1984; Kendler, & Karkowski-Shuman, 1997). Furthermore, the effects of depression are ubiquitous and endured by many diverse patient populations (Riolo, Nguyen, Greden, & King, 2005). The proposed study hopes to investigate this disorder in an attempt to better understand the psychological factors that may predispose one towards depressive symptoms.

Increased annual healthcare costs have been observed in individuals diagnosed with depression. One study suggests that these patients incur greater costs at every level of measured health care, including primary care, medical specialty, laboratory, pharmacy, and inpatient (Simon, VonKorff, & Barlow, 1995). Interestingly, the results of the study also indicated that these differences in healthcare expenditures persisted even after one year of treatment initiation for depression. A 2002 study (Egede, Zheng, & Simpson) examined the healthcare costs of depression amongst patients diagnosed with diabetes. Healthcare was examined along four different categories – ambulatory visits, hospital

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inpatient days, emergency department visits, and use of prescription medications. Of the

825 diabetics included in the study, 85 were found to have clinical depression. This

depressed population, on average, had significantly more ambulatory visits over the

course of one year than their non-depressed counterparts. Furthermore, the depressed

patients filled out significantly more prescriptions on average than did the non-depressed

patients. This increase in prescription usage translated into significant financial cost as

well.

Depression & Attachment

The relationship between attachment style and depression has been studied in the

context of patients with chronic pain. A 2003 study found that patients with fearful

attachment styles demonstrated significantly higher levels of depression than patients

with other attachment styles (Ciechanowski, Sullivan, Jensen, Romano, & Summers,

2003). Furthermore, patients with secure attachment styles reported lower levels of

depression. When controlling for depression, patients with preoccupied attachment styles

reported more frequent pain-related healthcare visits.

One interesting study linked maternal postnatal depression with their child's

attachment style. Ninety-one mother-child pairs were recruited during the postnatal

period and then followed up with thirteen years later (Murray, Halligan, Adams,

Patterson, & Goodyer, 2006). Mothers with postnatal depression were linked to children

with more insecure attachment in early infancy, as well as adolescent emotional

sensitivity and depression. Also, a study conducted with suicidal adolescents

demonstrated a correlation between attachment style and depression. Adolescent maternal attachment accounted for significant variation in depressive symptoms (DiFillipo & Overholser, 2000).

The relationship between depression and attachment style in an outpatient setting has been studied as well. In one study, eighty-four psychiatric outpatients had their attachment styles assessed – those with depression where more likely to demonstrate anxious attachment styles (Pettem, West, Mahoney, & Keller, 1993). These anxiously attached patients were characterized by either more intense care-seeking behavior or angry withdrawal.

To the author's knowledge, the current study is the only one that has attempted to demonstrate a relationship between attachment style, depression, and specific healthcare outcomes.

Depression & Pregnancy

Significant attention has been paid to studying depression in pregnant populations. One such study examined pregnant immigrants and found that depressive symptoms were correlated with poorer functional status and more somatic symptoms (Zelkowitz, Schinazi, Katofsky, Saucier, Valenzuela, Westreich, & Dayan, 2004). A recent systematic review examined prevalence rates of depression among perinatal patients. It concluded that nearly 20% of women will experience depressive symptoms in the first three months following parturition (Gavin, Bradley, Lohr, Meltzer-Brody, Gartlehner, & Swinson, 2009). It has also been reported that approximately 7% of

women will report a major depressive episode in the year leading up to pregnancy, whereas nearly 13% will experience a major depressive episode at some point during the pregnancy (Stewart, 2011).

In 2004, a large-scale study using self-report measures was conducted in England. This prospective study tracked depressive symptoms both during and after pregnancy. The researchers found that the majority of postpartum depression cases were preceded by antepartum depression (Heron, O'Connor, Evans, Golding, & Glover, 2004). In addition to studying depression, the previous study also considered symptoms of anxiety during and after pregnancy. One additional noteworthy finding of this study was that postpartum depression was best predicted by antenatal anxiety, even when antenatal depression had been controlled for.

The prevalence and impact of antenatal depression is well documented, such that the National Institute of Health recommends routine depression screening during pregnancy with the following questions: 1) During the past month, have you been bothered by feeling down, depressed, or hopeless? 2) During the past month, have you been bothered by having little interest or pleasure in doing things? (Bellantuono, Marini, & Lucarelli, 2013). Additionally, it has been recommended that providers follow up with either the Edinburgh Postnatal Depression Scale or the Patient Health Outcomes Questionnaire 9 (Stewart, 2011). Failure to identify pregnant women may result in a variety of birth complications. Stewart (2011) writes:

> Untreated depression during pregnancy has been associated with increased risks of miscarriage, low birth weight, and preterm birth. Infants of depressed mothers, as compared with mothers who are not depressed, have been reported to have increased irritability, fewer facial expressions, and higher cortisol levels and to be

at risk for developmental delay. However, some of these findings are potentially confounded by other factors associated with both depression and these adverse outcomes, such as alcohol or illicit-drug use and obesity.

In cases where pregnant women do experience depressive symptoms, research seems to indicate that such symptoms are likely to decrease over time even when untreated (Heron et al., 2004). In the Heron et. al (2004) study, women with antenatal depression were often found to have their symptoms remitted when studied for follow-up after parturition. This research is encouraging, as physicians are often limited in the number of antidepressants available to them when dealing with pregnant populations, as they must take care to avoid fetal toxicity (Wisner, Zarin, Hlmboe, Appelbaum, Gelenberg, Leonard, & Frank, 2000).

Stress & Attachment Style

Previous research has demonstrated the relationship between attachment style and subjectively experienced stress (Cassedy et al., in press). In particular, the role of cortisol is best understood as regulating the stress response. When stressed, the hypothalamic-pituitary-adrenal axis (HPA) and the sympathetic adrenal medullary pathway activate a fight-or-flight response (Maunder & Hunter, 2001; Papadimitriou & Priftis, 2009). This bolsters the immune system via cortisol secretion, which prepares white blood cells to thwart infectious agents (Glaser & Kiecolt-Glaser, 2005). Sustained stress for over one hour, however, begins to suppress the immune system, homeostatically returning the system to its baseline. Longer durations of stress will result in continued cortisol excretion, suppressing the immune system by up to 40-70% (Sapolsky, 2004). This in turn leaves the body susceptible to infectious disease (Gatchel, Baum, & Krantz, 1989).

The process of immunosuppression pertains to attachment theory, as interpersonal stressors often persist for longer than one hour (Herbert & Cohen, 1993). For example, fear of social evaluation may activate the HPA and cortisol release, thus resulting in immunosuppression (Dickerson & Kemeny, 2004). In particular, this reaction to interpersonal stress is especially relevant to individuals with insecure attachment styles, as they typically have difficulty resolving interpersonal problems (Corcoran & Mallinckrodt, 2000).

Adults with an insecure attachment style may display varying pathology

associated with stress. Preoccupied attachment style is correlated with increased levels of

cortisol and decreased levels of cellular immune function (Jaremka et al., 2013; Powers,

Pietromonaco, Gunlicks, & Sayer, 2006). More specifically, preoccupied attachment

style is associated with low cortisol levels upon waking, but with consistently higher

cortisol levels throughout the day (Kidd, Hamer, & Steptoe, 2013; Quirin, Pruessner, &

Kuhl, 2008). Additionally, adults with dismissing attachment styles have been found to

have heightened cortisol levels during interpersonal challenges (Kidd, Hamer, & Steptoe,

2011; Rifkin-Graboi, 2008). Though they may typically report less distress than those

with other attachment styles, individuals with dismissing attachment style also have

elevated high-frequency spectral bandwidths of heart rate variability, another

physiological indicator of stress (Cassedy et al., in press; Maunder, Lancee, Nolan,

Hunter, & Tannenbaum, 2006).

The Role of Pain

In addition to the process of immunosuppression, the investigators examined the

role of pain as an indicator of subjective distress. Previous research has demonstrated

that insecure attachment style is associated with increased reporting of pain, as well as

lower tolerance of pain. One study found that pain patients with a preoccupied

attachment style sought more medical interventions than did those with other attachment

styles, even after accounting for premorbid healthcare utilization (Ciechanowski,

Sullivan, Jensen, Romano, & Summers, 2003). Another study utilized a coldpressor task

to induce pain in healthy participants. They observed that participants with preoccupied

attachment styles tolerated less pain than did those with dismissing attachment styles (Andrews, Meredith, & Strong, 2011). Overall, it seems to be the case that individuals with preoccupied attachment have poorer pain management skills, which may result in increased treatment seeking behavior, increased healthcare utilization, and greater reporting of symptoms. Conversely, patients with dismissing attachment styles are more likely dismiss their own physical and emotional pain.

Mikail, Henderson, and Tasca (1994) postulated one process by which attachment style may relate to patients' experiences of pain: securely attached individuals experience less pain because they are more comfortable seeking medical care, complying with treatment, and utilizing effective social support. People with preoccupied attachment styles, however, may become frustrated with treatment if their pain persists and sabotage their treatment. Conversely, patients with dismissing attachment styles are less likely to seek medical care and adhere to treatment regimens, as they are generally more skeptical of others' ability to provide adequate care. In turn, they may behave in a hostile manner towards providers and prematurely terminate treatment. Individuals with fearful attachment will typically only seek medical attention when their pain has reached a point of crisis. They may present with feelings of hopelessness in addition to demonstrating a disorganized resistance to treatment (Ciechanowski, Walker, Katon, & Russo, 2002; Mikail et al., 1994).

Healthcare Utilization & Attachment

Although attachment style may directly manifest itself physically as discussed above, it may also influence one's health via indirect mechanisms, which may impact health outcomes. Attachment styles affect how one approaches healthcare, forms patient-provider relationships, and adheres to treatment plans, all of which contribute to medical outcomes (Ahrens, Ciechanowski, & Katon, 2012; Hunter & Maunder, 2001).

Patients with secure attachment have learned how to obtain help when needed (Mikulincer, Shaver, Sapir-Lavid, & Avihou-Kanza, 2009). When confronted with health concerns, they are more likely to seek medical care than their insecurely attached counterparts, as they form trusting relationships with medical providers and adhere to medical recommendations. Patients with dismissing attachment styles, however, have difficulty trusting others, including medical personnel. Therefore, they are more likely to delay medical attention and are slower to trust their medical providers. Without a secure patient-provider relationship, these individuals are less likely to comply with proposed medical advice. On the other hand, patients with a preoccupied attachment style may feel insecure about their own capacity for self-care, and hence may more quickly look to others for support and medical attention (Feeney & Ryan, 1994; Shaver, Schachner, & Mikulincer, 2005).

Attachment styles have been shown to relate to treatment adherence – several studies have assessed the relationship between attachment style and diabetes, for example, as outcomes of this disease are highly related to adherence behaviors

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(Bazzazian & Besharat, 2012; Ciechanowski & Katon, 2006; Morris, Berry, Wearden, Jackson, Dornan, & Davies, 2009). Patients with diabetes and dismissing attachment styles have been shown to maintain lower levels of exercise, foot care, diet, and medication adherence, and they report higher rates of smoking than those with secure attachment. This reflects these patients' tendencies to resist seeking medical help from others, as well as to engage less in disease management (Ciechanowski, Russo, Katon, Korff, Ludman, Lin, & Bush, 2004).

Additional research demonstrates that patients with diabetes and dismissing attachment style also have worse adjustment to disease, compared to those with other attachment styles (Ciechanowski, Katon, Russo, & Walker, 2001; Turan, Osar, Turan, Ilkova, & Damci, 2003). Thus, patients with diabetes and dismissing attachment styles have significantly higher mortality rates over five years than those with other attachment styles (Ciechanowski, Russo, Katon, Lin, Ludman, Heckbert, & Young, 2010).

On the other hand, a preoccupied attachment style may be advantageous for medical conditions that benefit from repeated treatment seeking, such as diabetes. Patients with diabetes and preoccupied attachment style have been shown to have better treatment adherence and health outcomes than those with other attachment styles, including those with secure attachment, perhaps surprisingly (Ciechanowski et al., 2004). It should be noted, however, that patients with preoccupied attachment styles might also frustrate providers who are not able to adequately handle their patients' anxious dependence (Feeney, 2000).

The Role of Medical Providers

The patient-provider relationship is highly correlated with patient health outcomes, as the relationship may affect treatment adherence as well as help-seeking behaviors and satisfaction with care (Ha & Longnecker, 2010; Hooper, Tomek, & Newman, 2012). For example, cancer patients with insecure attachment styles are more likely to have impaired patient-provider relationships, to report less trust in their physicians, and to identify as being less satisfied with their care (Holwerda, Sanderman, Pool, Hinnen, Langendijk, Bemelman, & Sprangers, 2013).

In addition to the patients themselves, medical providers can also be affected by the patient-provider relationship. Providers may perceive patients with insecure attachment styles as being more difficult to manage than those with secure attachment. In addition to impairing the providers' satisfaction with their work, it may also affect their subsequent treatment guidance (Maunder et al., 2006; Pietromonaco, Uchino, & Schetter, 2013). Patients exhibiting such a fragile relationship with their providers are more likely to undergo additional diagnostic testing and referrals to other specialists, reflecting what is likely to be a mutually unsatisfying relationship for both patient and provider (Jackson, Chamberlin, & Kroenke, 2001).

Attachment style can be a strong contributing factor to subjective health outcomes, such as quality of life and satisfaction with care. For example, HIV-positive patients with insecure attachment styles are more likely to experience greater stress and worse adjustment to their illness than those with a secure attachment (Koopman, Gore-Felton, Marouf, Butler, Field, Gill, & Spiegel, 2000; Turner-Cobb, Gore-Felton, Marouf,

Koopman, Kim, Israelski, & Spiegel., 2002). Patients with lupus and a preoccupied attachment style are more likely to report poorer quality of life; those with a dismissing attachment are more likely to be non-adherent with their treatment (Bennett, Fuertes, Keitel, & Phillips, 2011). Overall, it appears to be the case that medical patients with insecure attachment styles appear to struggle with illness adjustment.

Although the present study did not seek to study the role of medical providers directly, it was the investigator's hope that a more thorough understanding of patient attachment styles would improve the quality of provider-patient interactions. A better understanding of the present psychological dynamics, including attachment patterns, can only better to serve patient populations and ultimately lead to improved healthcare outcomes. Ultimately, it was the author's hope that caregivers might someday be able to provide more tailored, individualized care as they consider the attachment styles of their patient populations.

AIMS & HYPOTHESES

Primary Areas of Interest

Aim I: To examine the relationship among attachment styles, depressive symptomatology and perceived stress.

Hypothesis I.a: Insecurely attached patients will collectively obtain higher scores on a measure of depressive symptomatology than securely attached subjects.

Depressive symptoms were measured with the Edinburgh Postnatal Depression Scale (Cox, Holden, & Sagovsky, 1987). This 10-item scale measured the extent to which patients experienced depressive symptoms within the past week from the time of their enrollment. In examining such an association between attachment and depression, it was hoped that treatment providers may be better able to understand their patient population and provide more tailored, individualized care. Although originally designed for women who are postpartum, the EPDS has been approved for pregnant populations as well (Bergink et al., 2011).

Hypothesis I.b: Insecurely attached patients will collectively obtain higher scores on a measure of perceived stress than securely attached subjects.

Subjective patient stress was measured by the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983). This 10-item self-report measure has been validated to measure how uncontrollable and stressful subjects perceive their lives to be. Each question is scored on a Likert-type scale, and correlations between these scores and ratings of attachment will be examined. The proposed model hypothesized a positive

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correlation between insecure attachment and perceived stress. It was thought that perhaps insecurely attached patients would have greater difficulty managing life's difficulties, and would therefore report greater levels of subjective stress.

Hypothesis I.c: Stress will serve as a moderating variable between attachment style and severity of depressive symptomatology.

Under the current proposed model, stress would act as a moderating variable between patient attachment style and depressive symptoms – it is believed that this is the first time that stress has been studied as such. It was hypothesized that under stress, patient attachment styles would become activated. Under greater levels of stress, the author considered that increased levels of depressive symptomatology would be reported. Patients with secure attachment styles and lower levels of perceived stress were hypothesized to report less severe depressive symptoms than their insecurely attached, higher stress counterparts.

Aim II: To examine the relationship among patient attachment styles, health care utilization, depression and stress.

Hypothesis II.a: Insecurely attached participants will utilize healthcare at greater levels than securely attached patients.

Hypothesis II.b: Stress will serve as a moderating variable between attachment style and level of healthcare utilization.

Hypothesis II.c: Depressive symptoms will serve as a moderating variable between attachment style and level of healthcare utilization.

Study subjects had various health indices measured through Baylor University Medical Center's (BUMC) electronic medical systems as part of a secondary analysis. The study was conducted on BUMC's antepartum unit, which consisted of maternal populations dealing with pregnancy complications. Research investigators tracked patient medication utilization and hospital length of stay, as well as the use of p.r.n. (pro re nata – or as needed) medication for pain, depression, sleep, and anxiety. Demographic information was also examined, including the number of times patients have utilized medical and mental healthcare at various time points over the previous 12 months. This arm of the study served to further knowledge of attachment theory, as the study searched for objective, physical manifestations of the various attachment styles. Additionally, the investigators suspected that stress (as measured by the Perceived Stress Scale) and depression (as measured by the Edinburgh Postnatal Depression scale) would serve as a moderating variables to these health outcomes, such that insecurely attached patients who also report significant stress and depressive symptoms would be expected to demonstrate greater healthcare utilization. To the investigator's knowledge, this is the first time that stress had been studied as a moderating variable in this manner.

Secondary Areas of Interest

Hypothesis III.a: Individuals with preoccupied attachment styles will have longer lengths of stay than dismissive or securely attached patients.

This hypothesis served as a subset of *Hypothesis II.a*, wherein the study postulated that insecurely attached patients would collectively utilize healthcare at greater levels than securely attached patients. *Hypothesis III.a* essentially argues that within insecurely attached patients, those with preoccupied styles would utilize healthcare more so than their dismissive counterparts in a specific manner. Following attachment theory, it was hypothesized that these preoccupied patients would be more likely to experience difficulty in separating with their healthcare providers and hence may stay within the hospital system for increased duration.

Hypothesis III.b: Individuals with a preoccupied attachment style will obtain higher scores on a depression scale than either dismissive or securely attached patients.

This hypothesis was a more specific form of *Hypothesis I.a,* wherein insecurely attached patients as a whole were predicted to obtain higher depressive scores than securely attached patients. Previous literature had correlated preoccupied attachment with depressive symptoms (West & George, 2002) – Bowlby (1969) hypothesized that preoccupied attachment results from disordered mourning, and predisposes one to depression. The current study sought to further examine this relationship.

Hypothesis III.c: Individuals with secure attachment styles will report lower pain scores than insecurely attached patients.

As part of examining patient healthcare utilization under *Aim II,* the author sought to analyze patients' subjective pain scores. Previous literature had thus far been inconclusive, with some research indicating that insecurely attached patients report greater levels of pain, and others finding no correlation (McWilliams et al., 2000; McDonald & Kingsbury, 2006; Williamson et al., 2002). It was hypothesized that securely attached patients are better equipped to deal with the psychological distress and subjective component associated with pain, and hence would report lower pain scores to their treatment team.

CHAPTER THREE
Methodology

PARTICIPANTS

Data for this research project was collected from September 2014 through April 2015, as part of a larger study that was being conducted at Baylor University Medical Center. Participants included 117 women on the BUMC antepartum unit (185 had been approached, for a 63% participation rate). This population consisted of pregnant women who were at sufficient maternal or fetal risk to require hospitalization. Patients opting to consent to the study were administered a short battery of measures to complete, including: the Edinburgh Postnatal Depression Scale, the Experiences in Close Relationships Scale – Short Form, the Attachment Style Questionnaire, the Perceived Stress Scale, and the Crowne-Marlowe Social Desirability Scale. Once enrollment was complete, statistical analyses were conducted to assess correlation amongst the variables of interest.

The inclusion criteria for this study were as follows: consenting English speaking pregnant women hospitalized on the antepartum unit of Baylor University Medical Center. The exclusion criteria for this study included the following: employees/students of BUMC, delirium, dementia, intellectual disability, psychosis, and active suicidal ideation.

METHODS AND PROCEDURES

Each day of conducted research began with the researcher screening the BUMC antepartum unit for new admissions. Participants that were deemed eligible for the study were approached for consent. The researcher informed the patient of the study aims and described the patient's rights as a participant in the study. After having time to read the consent form and ask questions, willing participants provided written consent to participate. The researcher then provided the subject with the packet of questionnaires, and arranged to pick up the materials at a later time.

The researcher then gathered appropriate demographic and healthcare information from electronic medical records. All participants were assigned a study number, and all study materials were identified only by their study number as a means of protecting confidentiality. Once the patient completed the self-report measures, they were retrieved by the researcher and entered into an electronic database. All consent forms and test materials were kept in a locked file in a secure research office, and the electronic data was not removed from the site premises. It is estimated that the entire process, including consenting, took approximately 30 minutes.

Moderation regression analyses were conducted to examine the relationship among the antepartum patients' attachment styles, depressive symptoms and healthcare utilization. The independent variable that was measured in this study was attachment style as measured by the Experiences in Close Relationships Scale – Short Form and the Attachment Style Questionnaire. The dependent variables examined were depression (as measured by the Edinburgh Postnatal Depression Scale) and health outcomes such as

length of style and medication utilization. Independent t-tests and multivariate analyses of variance (MANOVAs) were utilized to examine group differences. Secondary analyses included examining the role of social desirability on attachment style and depressive symptom reporting. Additionally, exploratory analyses examining subgroups of insecure attachment (i.e., preoccupied, dismissive and fearful-avoidant) were undertaken.

MEASURES

Edinburgh Postnatal Depression Scale (EPDS) (Cox, Holden, & Sagovsky, 1987).

Description

The EPDS is a 10-item multiple-choice self-report measure used to screen for perinatal depression. Items on the measure address common depressive symptoms that do not occur in the context of pregnancy; thus, symptoms of fatigue or changes in appetite are excluded. The test could be completed in less than 5 minutes, and consists of items rated on a Likert scale, with values ranging from 0 to 3, resulting in a composite score of 0 to 30. Scores of 10 or higher were indicative of possible depression and warranted additional follow-up (Cox et. al, 1987). The EPDS was administered as part of standard practice at BUMC, and all patients scoring 13 or greater received a psychology consult that took place after completion of the study's measures.

Validity

The EPDS has been validated in multiple languages, including Italian and Dutch (Cox & Holden, 2003; Cox, et al., 1987; Benvenuti, et al., 1999; Pop, et al., 1992). It has also been validated in community samples (Murray & Caruthers, 1990) and non-postnatal women (Cox, et al, 1996). Although this measure was originally designed for postpartum populations, it has been validated for use in pregnant populations as well (Bergink et al., 2011).

Reliability

The standard α coefficient of the EPDS is 0.87, and the split-half reliability has been shown to be 0.88 (Cox & Holden, 2003).

Attachment Styles Measure (Hazan & Shaver, 1987).

Description

Hazan and Shaver (1987) developed one of the first measures of attachment that is still widely used today. The tool is simple and easy to use, and the subjects completed it in approximately one minute. The qualitative measure posed one question to the reader: "Which of these best describes your feelings?" The subject was then presented with three short paragraphs of two to three sentences each. Each option contained statements such as "I find it relatively easy to get close to others" or "I am somewhat uncomfortable being close to others." The subject then chose which short paragraph best described their feelings. Depending on which choice the subject made, their attachment style was classified into Ainsworth's categories of either secure, avoidant, or anxious-ambivalent (Hazan & Shaver, 1987).

Validity

Hazan and Shaver's measure has been shown to correlate well with other measures of attachment (Bartholomew & Shaver, 1998). One study had its participants complete both Hazan & Shaver's measure of attachment, as well as Bartholomew & Horowitz's measure of attachment (Bartholomew & Howorwitz, 1991; Brennan, Shaver,

& Tobey, 1991). Analysis indicated that Hazan and Shaver's three classifications of attachment (secure, avoidant, anxious-ambivalent) correlate well with Bartholomew's categories of secure, preoccupied, fearful, and dismissing. Chi-square testing revealed that the two measures were significantly correlated, with a p < .001. Eighty two percent of those classified as secure on Bartholomew's measure were also secure on Hazan and Shaver's; of those who were preoccupied on Bartholomew's, 57% were anxious-ambivalent on Hazan and Shaver's; and of those who were fearful on Bartholomew's measure, 61% were avoidant on Hazan and Shaver's measure (Bartholomew & Shaver, 1998).

Reliability

Multiple studies have been conducted to examine the reliability of Hazan and Shaver's measurement tool. Test-retest correlations were conducted by Shaver and Brennan (1992) over an eight-month period. They demonstrated that the three categories of attachment had reliability coefficients ranging from .56 to .68. Levy and Davis (1988) used a slightly modified version of Hazan and Shaver's tool, and demonstrated reliability over a two-week period. They found coefficients of .48 for secure attachment, .58 for avoidant attachment, and .65 for anxious-ambivalent attachment. Hammond and Fletcher (1991) conducted a study similar to that of Levy and Davis (1988) and found moderate stability over a four-month timespan. They reported test-retest coefficients of .37 for secure attachment, .56 for avoidant attachment, and .47 for anxious-ambivalent attachment.

Experiences in Close Relationships Scale – Short Form (ECR – S) (Wei et al., 2007).

Description

      In 1998, Brennan, Clark, and Shaver conducted a factor analysis to examine the multitude of self-report measures that had been constructed at that time. After pooling all of the available data, 323 items from 14 available measures were found (Wei et al., 2007). Factor analysis revealed two relatively independent dimensions labeled *anxiety* and *avoidance* (Brennan et al., 1998). The items that loaded most heavily onto these scales were compiled into the Experiences in Close Relationships scale (ECR). This 36-item test has been used as a measure of attachment, not for mother-child dyads, but rather for adult-adult interpersonal relationships. This resulting survey was demonstrated to have sound psychometric properties (Brennan et al., 1998; Lopez & Gormley, 2002; Vogel & Wei, 2005).

      One of the concerns raised by Wei and colleagues was the survey's length. Original ECR data was collected with college students, and the author worried that other populations may not have the attention span necessary to complete all the test questions. Hence, a series of six studies were conducted to identify the most pertinent test items from the ECR and to determine the psychometric properties of the new, condensed test. The resulting effort was the Experiences in Close Relationships – Short Form (ECR – S), a 12 item-test that was found to have psychometric properties comparable to the original ECR (see below).

Validity

Testing revealed that the ECR – S demonstrated strong construct validity (Wei et al., 2007). Factor analysis showed that the ECR – S is comprised of two independent factors, anxiety and avoidance, that are also present in the original ECR. Attachment anxiety was shown to correlate with assurance seeking, a need for social approval, and emotional reactivity. Attachment avoidance, on the other hand, correlated significantly with fear of intimacy and discomfort with self-disclosure.

Reliability

The work of Wei et al. (2007) demonstrated that the ECR – S has good reliability. Coefficient alphas ranged from .77 to .86 for the anxiety subscale and from .78 to .88 for the avoidance subscale. A one-month test-retest further demonstrated strong reliability with the anxiety subscale having *r* values of .80 to .82, and the avoidance subscale having *r* values of .83 to .86.

Crowne-Marlowe Social Desirability Scale (Crowne & Marlowe, 1960).

Description

In 1960, Crowne and Marlow developed a scale to measure the extent to which an individual wishes to be seen as socially desirable. The scale includes items that enumerate various pro-social behaviors that are considered to be estimable, though rarely enacted. It includes 33 self-report items that are answered *True/False.* Testers who achieve scores of 20 or greater are considered to be highly concerned about their social

approval. These individuals may respond to testing items in manner such that they do not feel disapproved by those reading their test results.

This measure was considered for inclusion into this study as it served to provide valuable information about the patient population. Given that the EPDS and ASM are face-valid, self-report measures, inclusion of a measure such as the Social Desirability Scale was seen as a useful adjunct to the test battery. It was thought that this measure may be used to exclude patients who categorize themselves as securely attached as a perceived means of appeasing the test giver.

Validity

One of the objectives of the creation of this scale was to ensure that its scores did not relate to levels of psychopathology (Crowne & Marlowe, 1960). Tanaka-Matsumi & Kameoka (1986) demonstrated that various measures of depression and anxiety exhibited correlation coefficients ranging from -.19 to -.32 with this scale.

Reliability

Crowne and Marlowe (1960) demonstrated that the internal consistency coefficient for this measure is .88, and the test-retest value is .89. Various other researchers have demonstrated the internal consistency coefficient to be in the .70 to .79 range, though these studies were all conducted with students (Nordholm, 1974; Crino, Svoboda, Rubenfeld, & White, 1983; Tanaka-Matsumi & Kameoka, 1986). Crino et. al (1983) also indicated a test-retest correlation of .87.

Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983).

Description

The Perceived Stress Scale (PSS) is a 10-item instrument that was designed for patients with the ability to read at least at a junior high level. The test measures how uncontrollable and stressful respondents perceive their lives to be. The questions are generalizable and do not pertain to any specific stressful events, and thus may be answered by any respondent, regardless of current circumstances. Each item is scored on a 5 point Likert-scale, with 4 of the items requiring reverse scoring for interpretation. Overall, there are no cut-off scores associated with the PSS, but rather the tool is to be used for with-in group comparison purposes (Cohen et al, 1983). A national sampling of the PSS indicted a mean score of 13.02 and a standard deviation of 6.35 (Cohen & Williamson, 1988).

Validity

The 1983 Cohen et al. study reported that higher PSS scores were significantly correlated with depressive symptomatology, "though was found to measure a different and independently predictive construct" (p. 393). Higher PSS scores have also been found to correlate significantly with failure to quit smoking (Cohen & Lichtenstein, 1990).

Reliability

       Cohen et al. (1983) demonstrated coefficient alphas ranging from .84 to .86 during their study. Additionally, they found a two-day test-retest correlation of .85 with one community sample, and a six-week test-rest correlation of .55 with another.

OVERVIEW OF STATISTICAL ANALYSES

Power Analysis

Power analysis was conducted using G*Power 3.1 software (Faul, Erdfelder,

Buchner, & Lang, 2009). An a priori power analysis indicated that for a linear multiple

regression utilizing 3 predictors, a sample size of 88 would be sufficient to detect a

significant interaction (effect size = .15) with a power of .90 and an alpha of .05.

Demographics

Descriptive frequency statistics were calculated to describe the subjects' racial

and ethnicity data. These data were compared to publically available information on the

city of Dallas, as well as the nation at large. Furthermore, demographic information such

as age, years of education, and marital status were examined.

Primary Hypotheses

Hypothesis I.a: Insecurely attached patients will collectively obtain higher scores on a

measure of depressive symptomatology than securely attached subjects.

To determine if insecurely attached patients collectively obtained higher scores on

a depression scale than securely attached patients, an independent samples t-test was

utilized. The independent variable in this case was attachment style, which is comprised

of two levels – secure and insecure (as measured by the ECR – S and ASM). The

dependent variable was depression score (as measured by the EPDS). Additionally,

regression analyses were conducted. In one analysis, the predictors consisted of the

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avoidance and *anxiety* sub scores on the ECR – S; in another, the study employed the categorical labels present in the ASM. The criterion in both cases was the depression score obtained from the EPDS. In examining this hypothesis, as well as with all latter hypotheses to follow, the investigation was primarily concerned with the ECR-S data, as this provided the author with continuous variables for study, as opposed to the categorical values of the ASM.

Hypothesis I.b: Insecurely attached patients will collectively obtain higher scores on a measure of perceived stress than securely attached subjects.

Attachment styles were once again measured by the ASM and ECR-S, and subjective stress was measured by the Perceived Stress Scale. Independent t-tests for secure and insecure groupings were correlated with obtained PSS scores. Regression analysis was also utilized for the ECR-S subscales as predictors, and PSS scores as outcomes.

Hypothesis I.c: Stress will serve as a moderating variable between attachment style and severity of depressive symptomatology.

In considering the regression analyses that were utilized to understand the relationship between attachment style and depressive symptomatology, the study also examined the role of perceived stress as a moderating variable. PSS scores were incorporated into the aforementioned regression analyses to examine its fit within the proposed model.

Hypothesis II.a: Insecurely attached participants would utilize healthcare at greater levels than securely attached patients.

In considering the use of healthcare across styles of attachment, independent samples t-tests with Bonferroni corrections were performed. The independent variable was attachment style that was comprised of two levels – secure and insecure (as per the ASM), and the dependent variables were physician visits in past 12 months, hospital visits in past 12 months, ER visits in past 12 months, other healthcare visits in past 12 months, hospital length of stay, pain score, average number of pain medications per day, average number of sleep medications per day, average number of anxiety medications per day, and average number of depression medications per day. Additionally, a multivariate analysis of variance was performed with the *avoidance* and *anxiety* subscores on the ECR – S as the predictors and the previously described health outcomes as the criteria.

Hypothesis II.b: Stress will serve as a moderating variable between attachment style and level of healthcare utilization.

Hypothesis II.c: Depressive symptoms will serve as a moderating variable between attachment style and level of healthcare utilization.

In addition to the analyses conducted in *Hypothesis II.a,* the study wished to further examine the roles of stress and depressive symptoms within this model. Thus, the MANOVA analysis conducted in *Hypothesis II.a* was secondarily examined with both stress scores (obtained from the PSS) and depressive scores (EPDS) incorporated to test for moderation effects.

Secondary Hypotheses

Hypothesis III.a: Individuals with preoccupied attachment styles will have longer lengths of stay than dismissive or securely attached patients.

In considering length of hospital stay across styles of attachment, the study utilized independent samples t-tests. In each case, the independent variable was attachment style, and the dependent variable was days spent on the unit. Additionally, the previous MANOVA (from *Hypothesis II.a*) utilizing the *avoidance* and *anxiety* sub scores on the ECR – S was re-examined.

Hypothesis III.b: Individuals with a preoccupied attachment style will obtain higher scores on a depression scale than either dismissive or securely attached patients.

A more specific condition of *Hypothesis I.a*, the study also hypothesized that patients with preoccupied attachment styles would have higher depression scores than either securely attached or dismissively attached individuals. To test this, the author again made use of independent samples t-tests wherein the dependent variable was the depression score obtained on the EPDS. Furthermore, the previous MANOVA data (from *Hypothesis I.c*) using the ECR-S scores was re-examined.

Hypothesis III.c: Individuals with secure attachment styles will report lower pain scores than insecurely attached patients.

In order to determine if securely attached patients would report lower pain scores than insecurely attached patients, an independent samples t-test was utilized. The

independent variable was attachment style – secure and insecure – as measured by the

ASM. The dependent variable was pain score, obtained from nursing charts.

Additionally, the previous MANOVA (from *Hypothesis II.a*) utilizing the *avoidance* and

anxiety sub scores on the ECR – S was re-examined.

Additional Analyses

In addition to the analyses described above, the author utilized the Crowne-

Marlowe social desirability measure. In addition to running the analyses above, the

Crowne-Marlowe scores were treated as a covariate to account for possible false

reporting of secure attachment.

Further analyses included examination of the previous hypotheses through the use

of ECR-S median split scores (see Figure 1). Median values were calculated for both the

anxiety and avoidance subscores - subjects whose values were below the median value on

both subscales were categorized as secure; subjects whose values were below the median

score for anxiety, but above the avoidant median were categorized as dismissive; subjects

whose values were above the median score for anxiety, but below the median of

avoidance were categorized as preoccupied; subjects whose values were below both

median scores were classified as fearful. Convincing arguments have been made against

the use of this analysis in the literature, as statistical power is lost (MacCallum, Zhang,

Preacher, & Rucker, 2002), hence, such examination was considered secondary.

Insert Figure 1

CHAPTER FOUR
Results

DEMOGRAPHIC INFORMATION

Enrollment for the study began on October 29th, 2014 and concluded on April

20th, 2015. Of the 185 eligible participants that were approached, 62 declined (33.5%),

resulting in 123 potential participants available for data analysis. Out of the final 123

participants, however, 6 had incomplete data at the time of this writing. Hence, this

present analysis is comprised of the available data on 117 enrolled subjects.

The following tables summarize the demographic data for the population sampled

at BUMC. The majority of the following variables were obtained from a self-report

measure completed by the participants, whereas age and duration of pregnancy were

obtained from electronic medical records.

Insert Table 1

The sample consisted of 117 pregnant women, over half of which identified as

non-white/non-Latino – 42.7% (n = 50) were African-American, 14.5% (n = 17) were

Latino, and 3.4% (n = 4) were American Indian/Alaska Native, as presented in Table 1.

By comparison, recent census data indicates that in Dallas County, 23.1% of the

population identifies as African American, 39% as Latino, and 1.1% as American Indian

(United States Census Bureau, 2013).

Insert Table 2

Table 2 presents additional demographic information about the population

sample. The women in the study ranged in age from 18 to 45, with a mean age of 29.51

($SD = 6.59$). Years of education ranged from high school experience (9 years) to doctoral

degrees (21 years) with a mean of 14.46 years of education ($SD = 2.63$). Furthermore,

the women in the study were on average 27.74 weeks pregnant ($SD = 6.90$), ranging from

1 week to 37 weeks.

Insert Table 3

This table provides more specific data regarding the participants' marital status,

education, and stage of pregnancy. Fifty percent of the subjects were married ($n = 58$),

45.3% were never married ($n = 53$), 4.3% were divorced ($n = 5$), and 0.9% were re-

married ($n = 1$). Where Table 2 provides a mean education level, Table 3 provides more

detailed information. It can be seen that 5.1% of the subjects did not complete high

school ($n = 6$), 29.9% completed high school or earned their GED ($n = 35$), 24.8%

completed some college ($n = 29$), 20.5% earned a four-year college degree ($n = 24$), and

19.7% obtained a graduate degree – masters level or doctoral ($n = 23$). Furthermore,

Table 3 provides additional information regarding the subjects' stage of pregnancy –

4.3% of participants were in their 1st trimester ($n = 5$), 30.8% were in the 2nd trimester (n

$= 36$), and 65.0% were in their 3rd trimester ($n = 76$).

Insert Table 4

Table 4 examines some of the demographic variables when comparing subjects

from the *secure* versus *insecure* groups as defined by the Attachment Style

Questionnaire. Of the 117 enrolled patients, 82 responded to the questionnaire such that

they were categorized as *secure* in their attachment style, and 35 were labeled *insecure*.

Comparing the two groups, the study found that the securely attached participants had a

mean age of 29.73 years ($SD = 6.13$), whereas the insecurely attached subjects had a

mean age of 28.98 years ($SD = 7.64$, $p = .055$). The securely attached individuals had a

mean of 14.52 years of education ($SD = 2.65$) compared to 14.31 years of education for

their insecurely attached counterparts ($SD = 2.60$, $p = .693$). Lastly, the securely attached

patients were, on average, 28.09 weeks pregnant at time of enrollment ($SD = 6.33$),

whereas the insecurely attached subjects were 26.93 weeks pregnant ($SD = 8.14$, $p =$

$.090$).

Primary Hypotheses

Attachment, Depression, & Stress

Hypothesis I.a: Insecurely attached patients will collectively obtain higher scores on a measure of depressive symptomatology than securely attached subjects.

Using Hazan and Shaver's Attachment Style Questionnaire, subjects were grouped into the categories of *secure* and *insecure*. With attachment style serving as the independent variable, and depression score on the Edinburgh Postnatal Depression Scale as the dependent variable, an independent samples t-test was conducted. Table 5 indicates the relationship between the two variables.

Insert Table 5

As can be seen from Table 5, an independent samples t-test revealed a significant difference in how the securely attached patients responded to the EPDS versus the insecurely attached patients ($p = .047$). The 35 insecurely attached patients on average scored a 9.00 on the EPDS ($SD = 5.63$), whereas the 82 securely attached patients had a mean score of 5.71 ($SD = 4.81$). The subgroupings were examined within the insecurely attached patients – dismissive subjects had a mean score of 8.81 ($SD = 5.72$) and preoccupied subjects had a mean score of 10.50 ($SD = 5.32$). Overall, EPDS scores in the total sample ranged from 0 to 20 with a mean score of 6.69 ($SD = 5.62$).

In addition to analyzing the subjects by their self-reported attachment style via the Attachment Style Questionnaire, a regression analysis was conducted using the *anxious* and *avoidant* subscales of the Experiences in Close Relationships Scale – Short Form. The two subscales, along with their product (to examine interaction effects), were the predictor variables, with the EPDS score being used as the outcome variable. Tables 6 and 7 demonstrate these relationships.

Insert Tables 6 & 7

Overall, the total sample demonstrated a mean *anxiety* subscore of 2.94 ($SD = 1.07$) and a mean *avoidance* subscore of 2.34 ($SD = 1.59$). Utilizing the *anxiety* and *avoidance* subscales in the regression analysis, the resulting model accounts for nearly 20% of the variance (adjusted $R^2 = .197$) in the EPDS scores. The anxiety subscale demonstrated significance with EPDS scores ($b = .412$, $t = 4.83$, $p < .001$) though the *avoidance* subscale ($b = .146$, $t = 1.714$, $p = .089$) did not. Furthermore, the interaction variable did not demonstrate statistical significance with EPDS scores ($b = .038$, $t = .461$, $p = .645$). Thus, the variance in the model appears to be driven primarily by the anxiety subscale, and not the avoidance subscale nor the interaction variable.

Hypothesis I.b: Insecurely attached patients will collectively obtain higher scores on a measure of perceived stress than securely attached subjects.

Hazan and Shaver's Attachment Style Questionnaire was utilized to divide the patient population into secure and insecure groupings. An independent samples t-test was conducted, with attachment style serving as the independent variable; subjective stress on the Perceived Stress Scale was the dependent variable. Table 8 indicates the relationship between the two variables.

Insert Table 8

As can be seen from the table, there was not a significant difference in how the securely attached patients responded to the PSS versus the insecurely attached patients (p = .576). The 35 insecurely attached patients on average scored an 18.60 (SD = 7.54), whereas the 82 securely attached patients had a mean score of 13.20 (SD = 7.58). In examining the subgroupings of the insecurely attached subjects, the study finds that the dismissive group averaged a score of 18.29 (SD = 7.90) and the preoccupied subjects had a mean score of 21.00 (SD = 3.16). The overall sample demonstrated PSS scores ranging from 1 to 36, with a mean score of 14.81 (SD = 7.93). A sampling of 2,837 members of the general U.S. population demonstrated a mean score of 13.02 and a standard deviation of 6.35 (Cohen & Williamson, 1988). It should be noted that in Cohen & Williamson's sampling, the female participants exhibited a mean score of 13.7 (SD = 6.60).

In addition to utilizing the categorical groupings of insecure and secure, a regression analysis was also conducted using the continuous anxious and avoidant variables of the Experiences in Close Relationships Scale – Short Form. The two subscales were the predictor variables, along with their product to test for interaction effects, with the PSS score serving as the outcome variable. Tables 9, 10 and 11 demonstrate these relationships.

Insert Tables 9 - 11

Overall, it can be seen that the total sample demonstrated a mean anxiety score of 2.94 (SD = 1.07) and a mean avoidance score of 2.23 (SD = 1.16). In analyzing the anxiety and avoidance subscales in the regression analysis, the resulting model accounts for approximately 35% of the variance in the PSS scores (adjusted R^2 = .352). These individual subscales correlate significantly with PSS scores - the anxiety subscale (b = .506, t = 6.608, p < .001) and avoidance subscale (b = .225, t = 2.938, p = .004) both demonstrate statistical significance. The interaction variable did not demonstrate statistical significance with PSS scores (b = .131, t = 1.750, p = .083). Thus, it appears that although anxiety and avoidance both individually predict PSS scores, their interaction does not.

Hypothesis I.c: Stress will serve as a moderating variable between attachment style and

severity of depressive symptomatology.

Tables 12 and 13 show data for the model that incorporates the following

variables: anxiety, avoidance, stress, stress-anxiety interaction, stress-avoidance

interaction. Comparing this to Table 10, it can be seen that the model now accounts for a

greater percentage of the variance in EPDS scores (adjusted R^2 = .640, F(5, 111) = 42.25,

p < .001). Looking deeper into the data with Table 13, however, the interaction variable

of PSS scores and ECR-S avoidance scores is not significant (b = -.013, t = -.185, p =

.853), nor is the interaction variable of stress and anxiety scores (b = .039, t = 637, p =

.526). Additionally, with the inclusion of stress in the model, it can be seen that the

ECR-S anxiety (b = -.014, t = .202, p = .840) and avoidance (b = -.026, t = -.358, p =

.721) subscores are no longer significant with regard to depressive symptoms. PSS

scores, however, do demonstrate statistical significance (b = .813, t = 11.54, p < .001). It

thus appears that stress accounts for the majority of the variance in depressive scores.

Insert Tables 12 & 13

To better understand the relationship between the ECR-S subscores and perceived

stress, a bivariate correlation was conducted.

Insert Table 14

The data indicate that stress levels are significantly correlated with both anxiety ($p < .001$, $r = .554$) and avoidance ($p < .001$, $r = .328$) subscores. Additionally, it can be seen that anxiety and avoidance are statistically similar as well ($p = .018$, $r = .218$). Overall, the results of the bivariate correlation revealed that the variables of stress, anxiety, and avoidance are all significantly correlated, but that stress serves as a more robust predictor for depression scores than relational anxiety and avoidance.

Attachment and Healthcare Utilization

Hypothesis II.a: Insecurely attached participants will utilize healthcare at greater levels than securely attached patients.

To differentiate between *secure* and *insecure* attachment styles, Hazan and Shaver's tool was once again utilized. Healthcare information was derived from a self-report questionnaire, as well as from electronic medical records. Table 15 details the relationship between these attachment styles and the measured aspects of healthcare utilization through the use of independent samples t-tests.

Insert Table 15

T-test analysis indicates that on average, insecurely attached patients visited an outpatient physician 10.69 times within the past twelve months ($SD = 10.03$), whereas securely attached patients tended to visit physicians 14.05 times ($SD = 14.21$, $p = .549$). On average, insecurely attached patients visited another healthcare provider (dentist, therapist, etc.) 2.00 times within the past twelve months ($SD = 2.90$), whereas securely

attached patients visited other healthcare providers 2.90 times ($SD = 4.99$, $p = .281$).

Insecurely attached patients spent 1.51 nights in the past year hospitalized ($SD = 2.48$),

and securely attached subjects spent 2.11 nights in a hospital ($SD = 5.95$, $p = .237$).

Regarding visits to the emergency room, insecurely attached patients averaged 1.60 visits

in the past twelve months ($SD = 2.32$), whereas securely attached patients demonstrated a

mean of 1.68 visits ($SD = 2.35$, $p = .931$). Patient length of stay was also tracked, which

included both time spent on the antepartum unit as well as time spent on any other units

during that stay. Insecurely attached subjects averaged 15.17 days spent at BUMC ($SD =$

22.20), compared to securely attached individuals who had a length of stay of 13.63 days

($SD = 16.29$, $p = .256$).

The two groups differed in their medication utilization while at BUMC. The

insecure group on average consumed 1.36 pain medications per day ($SD = 1.64$), and the

secure group utilized 1.24 pain medications per day ($SD = 1.35$, $p = .475$). Comparing

sleep medications, insecurely attached clients averaged .19 per day ($SD = .45$) and their

securely attached counterparts consumed .08 per day ($SD = .26$, $p < .001$). In analyzing

anxiolytics, the insecurely attached clients consumed .001 per day ($SD = .003$), and the

securely attached subjects consumed .021 per day ($SD = .106$, $p = .021$). In analyzing the

difference in anti-depressive usage, the insecurely attached patients consumed .029

medications per day ($SD = .169$), whereas securely attached patients averaged .012 anti-

depressants per day ($SD = .110$, $p = .217$).

As t-tests were run across 10 independent variables, the study utilized a

Bonferroni correction to adjust for possible type-I error, producing a new *p-value*

threshold of .005 (.05/10 = .005). Under this more stringent criterion, only the difference in sleep medications/day was found to be statistically significant between the two groups ($p < .001$).

The data was also analyzed using the ECR-S subscores via a MANOVA. The subscores were standardized and tested along with an interaction variable (the product of the two subscores) to determine possible correlation with the above health outcomes.

Insert Table 16

The data reveal that there was not a statistically significant difference in health outcomes based upon ECR-S anxiety scores ($F(10, 104) = .809$, $p = .620$, Wilk's $\Lambda = .928$, partial $\eta^2 = .072$). Furthermore, there was not a significant difference in health outcomes based on ECR-S avoidance scores ($F(10, 104) = 1.766$, $p = .076$, Wilk's $\Lambda = .855$, partial $\eta^2 = .145$). Lastly, there was not a significant difference based upon the interaction between anxiety and avoidance ($F(10, 104) = .863$, $p = .570$, Wilk's $\Lambda = .923$, partial $\eta^2 = .077$). Hence, the results of the MANOVA analysis do not support this hypothesis.

Hypothesis II.b: Stress will serve as a moderating variable between attachment style and level of healthcare utilization.

To test for the possible moderating effects of stress on healthcare utilization, a MANOVA was once again utilized (as in *Hypothesis II.a*), with PSS scores being included in the model.

Insert Table 17

From the data it can be seen that there was not a statistically significant difference in health outcomes based upon ECR-S anxiety scores ($F(10, 103) = 1.426$, $p = .179$, Wilk's $\Lambda = .878$, partial $\eta^2 = .122$). Furthermore, there was not a significant difference in health outcomes based on ECR-S avoidance scores ($F(10, 103) = 1.133$, $p = .345$, Wilk's $\Lambda = .901$, partial $\eta^2 = .099$). Additionally, there was not a significant difference based upon the interaction between anxiety and avoidance ($F(10, 104) = .755$, $p = .671$, Wilk's $\Lambda = .932$, partial $\eta^2 = .068$). There was, however, a statistically significant difference in health outcomes based upon stress scores ($F(10, 104) = 2.131$, $p = .028$, Wilk's $\Lambda = .829$, partial $\eta^2 = .171$). Thus, stress does not appear to be a moderating variable between attachment style and some health outcomes, but rather a significant predictor in its own right.

Insert Table 18

In analyzing the data on PSS scores further, stress was significantly correlated with ER visits in the past 12 months ($F(1, 103) = 11.48$, $p < .001$, partial $\eta^2 = .093$) and pain scores ($F(1, 103) = 5.19$, $p = .025$, partial $\eta^2 = .044$).

Hypothesis II.c: Depressive symptoms will serve as a moderating variable between attachment style and level of healthcare utilization.

To test for the possible moderating effects of depression on healthcare utilization, a MANOVA was once again utilized with EPDS scores being included in the model.

Insert Table 19

The data indicate that there was not a statistically significant difference in health outcomes based upon ECR-S anxiety scores ($F(9, 104) = .718$, $p = .692$, Wilk's $\Lambda = .942$, partial $\eta^2 = .058$). Furthermore, there was not a significant difference in health outcomes based on ECR-S avoidance scores ($F(9, 104) = 1.674$, $p = .105$, Wilk's $\Lambda = .873$, partial $\eta^2 = .127$). Additionally, there was not a significant difference based upon the interaction between anxiety and avoidance ($F(9, 104) = .891$, $p = .536$, Wilk's $\Lambda = .928$, partial $\eta^2 = .072$). Lastly, there was not a statistically significant difference in health outcomes based upon depression scores ($F(9, 104) = 1.222$, $p = .290$, Wilk's $\Lambda = .904$, partial $\eta^2 = .096$). Thus, the MANOVA does not appear to support this proposed hypothesis.

Secondary Hypotheses

Hypothesis III.a: Individuals with preoccupied attachment styles will have longer lengths of stay than dismissive or securely attached patients.

Independent samples t-tests were used to compare the Hazan & Shaver's groupings across hospital length of stay. Tables 20 and 21 show these relationships.

Insert Tables 20 & 21

The above analysis revealed no significant differences between neither the dismissive ($M = 15.61$, SD $= 23.55$) and preoccupied groups ($M = 11.75$, SD $= 4.65$, $p = .153$) nor between the dismissive and secure groups ($M = 13.63$, SD $= 16.29$, $p = .180$). As can be seen, however, this study lacked a significant number of subjects who self-reported a preoccupied attachment style with the Attachment Styles Measure. As such, the author looked elsewhere in the data to test this hypothesis.

The ECR-S MANOVA analyses tested in *Hypothesis II.a* provide further information in this case. For individuals with preoccupied attachment scores to have significantly different lengths of stay, the data should have indicated a significant correlation (with a negative partial η) between ECR-S anxiety scores and length of stay.

Insert Table 22

The above table shows the relationship between the four attachment styles and the expected partial η values (beta weights) to be found with the ECR-S anxiety and avoidance scales. In the case of those with preoccupied attachment, one would expect to find a positive correlation with the anxiety subscale, a negative correlation with the avoidance subscale, and a negative correlation with the interaction score (positive x negative = negative).

From the MANOVA in Table 16, the anxiety scores were not correlated with any of the health outcomes, length of stay included ($F(10, 104) = .809$, $p = .620$, Wilk's $\Lambda = .928$, partial $\eta^2 = .072$), and thus this hypothesis does not appear to be supported by this data.

Hypothesis III.b: Individuals with a preoccupied attachment style will obtain higher scores on a depression scale than either dismissive or securely attached patients.

Independent samples t-tests were again employed to compare the Hazan & Shaver's groupings across EPDS scores. Tables 23 and 24 show these relationships.

Insert Tables 23 & 24

The above analysis revealed no significant differences between the dismissive ($M = 8.81$, $SD = 5.72$) and preoccupied groups ($M = 10.50$, $SD = 5.32$, $p = .793$) as well as no significant difference between the dismissive and secure groups ($M = 5.71$, $SD = 4.81$, $p = 5.84$). Once again, however, this study lacked a large number of subjects who self-

reported a preoccupied attachment style with the Attachment Styles Measure. As such,

additional analyses were used to test this hypothesis.

The ECR-S data was employed to further examine this hypothesis. Specifically,

the regression analysis performed in *Hypothesis I.a* provides valuable information here.

Although the data indicate that anxiety subscores ($b = .412$, $t = 4.833$, $p < .001$) correlate

significantly with depression scores, the interaction variable did not correlate with

depression scores ($b = .038$, $t = .461$, $p = .645$), nor did avoidance subscores ($b = .146$, $t = 1.714$, $p = .089$), though they approach significance. For subjects with preoccupied

attachment styles, one would expect to find a negative interaction effect, as well as a

negative avoidance effect (see Figure 1). As this is not the case, the data do not seem to

support this secondary hypothesis.

Hypothesis III.c: Individuals with secure attachment styles will report lower pain scores

than insecurely attached patients.

In order to compare those subjects with secure attachment against those with

insecure attachment, an independent samples t-test for Hazan and Shaver's data was

utilized. Table 25 indicates the results of this analysis.

Insert Table 25

It can be seen that the total sample demonstrated a mean pain score of 1.16 ($SD = 2.37$). The table indicates that securely attached patients had a mean pain score of 1.05

(*SD* = 2.31), whereas the insecurely attached patients displayed a mean pain score of 1.43

(*SD* = 2.51, *p* = .250), indicating that there was not a statistically significant difference

between the two groups. Looking at the insecurely attached patients more closely, the

table indicates that the dismissive group had a mean score of 1.19 (*SD* = 2.29) and the

preoccupied group had a mean pain score of 3.25 (*SD* = 3.78).

      In utilizing the ECR-S data, the author once again refers to the MANOVA

analysis in *Hypothesis II.a.* The data indicated that there was not a difference in either

anxiety scores ($F(10, 104)$ = .809, *p* = .620, Wilk's Λ = .928, partial η^2 = .072),

avoidance scores ($F(10, 104)$ = 1.766, *p* = .076, Wilk's Λ = .855, partial η^2 = .145), nor

interaction scores ($F(10, 104)$ = .863, *p* = .570, Wilk's Λ = .923, partial η^2 = .077) with

health outcomes, including pain. Thus, the data do not support the hypothesis that

securely attached patients have pain scores that significantly differ from insecurely

attached patients.

CHAPTER FIVE
Conclusions and Recommendations

The purpose of the present study was to investigate the role of attachment on participant stress, depression, and healthcare utilization. Although previous literature has demonstrated some correlation amongst these variables (Ahrens, Ciechanowski, & Katon, 2012; Hunter & Maunder, 2001; Jaremka et al., 2013; Ciechanowsk et al., 2003), the study's objective was to present more complex models that might better explain these perceived relationships. In one model, the author hypothesized that attachment style might serve as a predictor for maternal depression, with stress serving as a moderator variable. In a second model, the study proposed that attachment style might serve as a predictor for various components of healthcare utilization, with both stress and depression serving as moderator variables.

Insert Figures 2 & 3

Previous research has analyzed some of the above constructs in the general population (Pettem et al., 1993; Jaremka et al., 2013; Powers, Pietromonaco, Gunlicks, & Sayer, 2006, Mikulciner et al., 2009). The present study focused exclusively on hospitalized pregnant mothers, as it was hypothesized that this potentially stressful setting would serve to activate the mothers' latent attachment style. The present study also significantly differs from previous research in its analysis of social desirability. As the measurements of attachment style were self-reported, it was hypothesized that a subset of

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the subjects may unintentionally and inaccurately endorse a secure attachment style, and

hence, the study sought to correct for this possible over-reporting of secure attachment.

First, an overview of the demographics of the patient populations is presented,

including comparisons of this study's subjects to the larger local population.

Subsequently, the study's findings will be addressed, reviewing the results previously

presented and considering how the data fit with the proposed models. Lastly, the author

will consider some of the limitations of the study, and contemplate potential future areas

of exploration in attachment research.

DEMOGRAPHIC QUALITIES

As can be seen from Table 1, the racial and ethnic demographics of the subjects in this study closely reflect those of the city of Dallas. In this study, 53.0% of the subjects self-identified as Caucasian, compared with 68.3% of the city of Dallas. Additionally, 44% of the subjects were African-American, 12.6% were Latino, and 1.1% were American Indian/Alaska Native, compared with 23.1% African American, 39% as Latino, and 1.1% American Indian for Dallas.

One manner in which this study's participants differed from that of the general population was in Perceived Stress Scale scores. As previously stated, the overall sample demonstrated a mean PSS score of 14.80 ($SD = 8.07$), whereas a sample of 2,837 members of the general U.S. population demonstrated a mean score of 13.02 ($SD = 6.35$) (Cohen & Williamson, 1988). This difference can likely be accounted for by this study's setting, as these participants were dealing with pregnancy complications that served to activate their salient attachment style.

With regard to marital status, nearly 50% of the participants were married, with the remainder being single (45%) or divorced (4.3%). This figure closely approaches the national average – available data from 2009 indicates that 52% of the 18 and over population is married (Ruggles, 2010). Though this study lacked sufficient power for analysis of the divorced cohort, future research may aim to investigate differences in attachment style and health outcomes for this population.

Additionally, this study's population may be compared to national averages with regard to educational attainment. In this sample, 95% of the subjects had received their

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high school diploma, compared with national 2014 data indicating that 88% of the adult

population has graduated from high school (United States Census Bureau, 2014).

Furthermore, the study found that 16% of these subjects had completed college,

compared with nearly 32% for the national average. One difference between this sample

and that of the national census, however, is that this study included subjects aged 18 and

over, whereas the national sample considers only adults ages 25 and older.

From Table 3 it can be seen that the majority of the subjects were in either their

2nd (30.8%) or 3rd (65.0%) trimester. This was to be expected, as pregnancy

complications are less likely to manifest during the early stages of pregnancy (Brandon,

2006). The author would argue that having patients in the latter stages of pregnancy is

beneficial to the study as these subjects would be more likely to have their attachment

styles activated (Brandon, 2006).

Additionally, the breakdown of 82 secure (70%) and 35 insecurely attached (30%)

individuals in Tables 4 and 5 is similar to previously reported findings in the general

population. Ainsworth, Blehar, Waters & Wall (1978) reported finding that

approximately 70% of their study sample demonstrated secure attachment, whereas 30%

demonstrated insecure attachment (20% avoidant, 10% preoccupied). A meta-analysis of

over 2000 subjects found that these prevalence rates were representative of the United

States and also approximated other Western countries well (Van Ijzendoorn &

Kroonenberg, 1988). Interestingly, the secure/insecure split in our sample mirrors that of

the general population, despite our sample displaying overall elevated social desirability,

as measured through the Crowne-Marlowe Social Desirability Scale (see Appendix E). It

may be the case that social desirability impacts, for example, the reporting of depressive symptoms and/or stress, but not attachment style. Further research is warranted in this area.

Overall, this study' sample is closely representative of the city of Dallas and the United States as a whole, which provides evidence for the generalizability of these findings. Perhaps the most significant way in which this study's sample differed from that of the general population, however, was in their stress scores ($M = 14.80$, $SD = 8.07$ vs. $M = 13.02$, $SD = 6.35$), with this study's sample reporting more stress. This study's sample exhibited higher levels of stress, most likely due to the acute medical problems that the participants were encountering at the time of enrollment.

DISCUSSION OF FINDINGS

It should be noted that although the following analyses made use of both

categorical predictors (from the Hazan and Shaver tool) as well as continuous predictors

(from the ECR-S), the study's focus lies primarily with continuous variables. Although

categorical values allow for simpler analysis, significant information and power is lost

(MacCallum et al., 2002). Additionally, it is likely the case that these subjects, and the

population at-large, are not so easily categorized by discreet attachment style labels, but

rather constitute a continuum of attachment traits (Cox, Owen, & Margand, 1992;

Cummings, 1990). Thus, the following discussion will deal first and foremost with

continuous predictors, and secondarily with Hazan and Shaver's Attachment Style

Questionnaire; additional analyses examining categorical constructs with the ECR-S may

be found in Appendix E.

Hypothesis I

The first hypothesis examined the relationships among attachment style,

depression, and stress. Through a series of t-tests and regression analyses, the

investigation was able to discern correlations amongst the studied constructs. The data in

Tables 6 & 7 demonstrate a relationship between both anxiety and avoidance subscales

with depression levels. Taken together, these variables account for 19.7% of the variance

observed in EPDS scores. The interaction between these two variables, however, was not

significantly correlated with depression. Utilizing the ECR-S data, the study found that

this initial hypothesis was supported, as it appears that insecurely attached subjects, i.e.

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those with higher anxiety and avoidance ratings, did indeed demonstrate statistically

significant elevated depression scores. Thus, the data indicate that attachment anxiety

and avoidance each independently predict depressive symptoms, but that no significant

interaction appeared to occur between the two. Previous research indicates that the

anxiety and avoidance subscales are largely orthogonal variables (Brennan, Clark, &

Shaver, 1998; Wei et al., 2007). Furthermore, these findings were largely similar to what

has been demonstrated in previous literature – as depression has been linked to anxious

attachment styles (Pettem et al., 1993), and is negatively correlated with secure

attachment styles (Ciechanowski et al., 2003). It should also be noted that in analyzing

the categorical data from the Attachment Style Questionnaire, no significant effects of

attachment style on depression scores were found, most likely due to a lack of power.

The first hypothesis also called for an exploration of the relationship between

attachment style and stress. In examining this relationship, the study found that each

ECR-S subscale significantly correlated with PSS scores. From Tables 10 & 11, it can be

seen that the regression model utilizing the two subscales accounted for 35.2% of the

variance in PSS scores. Once again, there did not appear to be a significant interaction

effect between the anxiety and avoidance scales. Thus, the primary hypothesis is

supported, as subjects with insecure attachment styles (those with elevated anxiety and

avoidance) demonstrated increased stress levels. These findings are supported by

previous literature (Jaremka et al., 2013). For instance, Jarekmka and colleagues (2013)

noted that preoccupied individuals display increased levels of cortisol, a biomarker for

stress. Similar findings have been demonstrated in other research (Kidd, Hamer, &

Steptoe, 2013; Quirin, Pruessner, & Kuhl, 2008). Furthermore, adults with dismissing

attachment styles have been found to demonstrate increased cortisol levels during times

of stress (Kidd, Hamer, & Steptoe, 2011; Rifkin-Graboi, 2008).

Thus far in the discussion, the reader may take note that attachment style appears

to be statistically correlated with both depression and stress. The interplay between all

three variables was examined in Tables 12 & 13, wherein the study examined the role of

stress as a possible moderator for the effect of attachment style on depression. Having

included stress into the predictive model, Table 12 indicates that the adjusted R^2 value

increased to .640, up from .197 (see Table 6). Thus, at first glance it appears as if stress

is adding to the predictive power of attachment style on depressive scores. An

examination of Table 13, however, indicates that this is not the case. Of the variables

analyzed, only stress holds statistical significance ($b = .813$, $t = 11.54$, $p < .001$) for

depression scores. Thus, the attachment variables of anxiety ($b = -.014$, $t = -.202$, $p =$

.840) and avoidance ($b = -.026$, $t = -.358$, $p = .721$) fall out of the proposed model, as

stress appears to significantly account for the variance in depressive symptoms.

Furthermore, neither the stress-anxiety moderator variable ($b = .039$, $t = .637$, $p = .526$)

nor the avoidance-stress moderator variable ($b = -.013$, $t = -.185$, $p = .853$) demonstrate

significance. Thus, the author concludes that stress appears to account for the variance in

depressive symptoms within the currently proposed model. Previous research has indeed

demonstrated a correlation between stress and depression (Hammen, 2005; Dahlin,

Joneborg, & Runeson, 2005).

In order to better understand the relationship between anxiety, avoidance, and stress, a bivariate correlation analysis was conducted amongst the three variables. Table 14 indicates that all three variables demonstrated statistical significance with each other. Interestingly, a significant correlation was found to exist between stress and anxiety ($r = .554$, $p < .001$), and also between stress and avoidance ($r = .328$, $p < .001$). Despite these significant correlations, anxiety and avoidance did not seem to account for any significant variance in depression scores once stress has been accounted for.

In consolidating the above information regarding *Hypothesis I*, the proposed model displayed in Figure 2 may be revised to the following:

Insert Figure 4

The data indicated that inclusion of attachment style is not necessary in a model that accounts for the relationship between stress and depression. Rather, stress serves as an adequate predictor for depressive symptoms, without the need for attachment style or other moderating variables. Thus, with regard to Hypothesis I, it may be considered that attachment style potentially has utility if it is able to provide information as to how subjects engage with their stress and make use of social support. Further research into this area is warranted.

Hypothesis II

Figure 3 summarizes Hypothesis II: attachment style will serve as a predictor for healthcare utilization, with stress and depressive symptoms serving as moderator variables. Initially, the relationship between categorical attachment style and healthcare utilization was analyzed. Through the use of independent samples t-tests, it was revealed that attachment style was predictive of sleep medication utilization ($p < .001$). Insecurely attached subjects ($M = .19$, $SD = .45$) consumed more sleep medications per day than did securely attached subjects ($M = .08$, $SD = .26$). Although the difference in the two groups is statistically significant, it did not appear to be clinically significant. The difference between the two groups is greater than a factor of 2, although in both cases subjects are, on average, consuming sleep medications at a rate of less than once every five days.

In re-examining the data via a MANOVA of the ECR-S scores, no statistically significant difference was observed with attachment style and healthcare utilization. Thus, the hypothesis that attachment style is predictive of healthcare utilization was not supported by the data found in Tables 15 & 16. Previous literature had found that individuals with preoccupied attachment styles were more prone to seeking medical attention (Feeney & Ryan, 1994; Shaver, Schachner, & Mikulincer, 2005). Furthermore, the study had expected subjects with dismissive attachment styles to resist seeking help from medical providers (Ciechanowski, 2004). The investigator postulates that the survey, which called for participants to recall their healthcare utilization, captured some meaningful data but may have lacked robust data that could be gathered in a larger

prospective study. Data that were captured from electronic medical records included length of stay and medication utilization; other healthcare utilization in the past year, however, was based upon subject recall. Furthermore, anecdotally, many subjects remarked that they were unsure of the number of times they had visited various providers within the past year, and listed approximate values. Thus, future prospective research in this area of investigation is still warranted using more objective healthcare measures that may be derived from medical records.

The next step in elucidating an understanding of subject healthcare utilization was to include stress in the proposed model. Re-running the previous MANOVA with the inclusion of stress yielded statistical significance ($p = .028$). Analyzing the effect of stress further in Table 18, it can be seen that stress scores were predictive of ER visits in the past 12 months ($F(1, 103) = 11.48$, $p < .001$, partial $\eta2 = .093$) and pain scores ($F(1, 103) = 5.19$, $p = .025$, partial $\eta2 = .044$). Hence, just as in Hypothesis I, it can be seen that stress has greater predictive power than attachment style.

The study next attempted to account for the role that depression plays in healthcare utilization. It had been hypothesized that depressive symptoms would moderate the effect that attachment style had upon healthcare utilization. It was discovered, however (via Table 19), that depression did not significantly correlate with healthcare utilization ($p = .290$) and thus did not appear to play a role as either a predictive variable, nor as a moderator.

Overall, in considering the second hypothesis, the data appear to indicate that the following model is in effect:

Insert Figure 5

Stress scores appear to account for a significant portion of the variance associated with some healthcare utilization variables. Indeed, previous research has indicated a correlation between stress and healthcare utilization. One study demonstrated decreased need for healthcare utilization after mindfulness-based stress reduction techniques were implemented with an inner city population (Roth & Stanley, 2001). Additional studies have revealed significant correlations between increased stress levels and increased healthcare utilization as well (Rahe, Taylor, Tolles, Newhall, Veach, & Bryson, 2002; Raphael, Zhang, Liu, & Giardino, 2010).

The results indicated that neither attachment style nor depression played a significant role in how subjects utilized healthcare in this study. It may be possible that either attachment style and/or depressive symptoms would have influence upon other aspects of healthcare utilization that were not measured. Furthermore, it may be possible that healthcare utilization in the past 12 months was not sufficiently sensitive, as participants were reliant upon recall of events that had transpired in the past year.

Secondary Hypotheses

In addition to the analyses above, the study investigated other specific relationships between attachment styles and various health outcomes. The first of these secondary hypotheses postulated that subjects with a preoccupied attachment style would

demonstrate longer lengths of stay at BUMC than either of the other attachment groups.

The presumption was believed to be that those with a preoccupied attachment style would

anxiously attach to their caregivers and delay being discharged from the hospital. The

data in Tables 20 – 22, however, do not support this hypothesis. Rather, the study

revealed that there were no significant differences (p = .620) among the observed

attachment groups with regards to their hospital length of stay.

Furthermore, it was hypothesized that individuals with a preoccupied attachment

style would demonstrate elevated depression scores. Previous research in an outpatient

setting had supported this hypothesis (Pettem, West, Mahoney, & Keller, 1993), although

the data in the present study do not. There was no observed correlation between the

interaction effect and depression scores that one would expect to find with preoccupied

attachment (p = .645, see Figure 1 and Table 7). Although preoccupied attachment style

(as measured by the Hazan and Shaver tool) did not correlate with depression scores,

anxiety subscores on the ECR-S did (b = .412, t = 4.833, p < .001). Thus, although the

data do not support this secondary hypothesis, the relationship between attachment style

components and depression is further elucidated as the continuous variable of anxiety

was found to be correlated with depression even though preoccupied attachment style

(the categorical equivalent of attachment anxiety) was not associated with depression.

Lastly, it was hypothesized that individuals with secure attachment styles would

report lower levels of pain than the other attachment groups. Mikail, Henderson, and

Tasca (1994) reported that securely attached individuals may experience less pain

because they are more comfortable seeking medical care, complying with treatment, and

utilizing effective social support. Further, one coldpressor study found that individuals

with preoccupied attachment style were less adept at tolerating pain (Andrews, Meredith,

& Strong, 2011). The data in the present study, however, indicated no significant

differences between how subjects in the various attachment groups reported their pain

scores. Neither anxiety scores ($p = .809$), avoidance scores ($p = .076$), nor the interaction

scores ($p = .570$) demonstrated significance with regards to pain scores.

Summation of Findings

Overall, the study provided several useful findings for the field of attachment

research. First, it was found that found that insecure attachment is correlated with

symptoms of depression. More specifically, components of anxiety and avoidance each

independently correlate with depressive symptoms, though their interaction does not.

Furthermore, these components of insecure attachment each individually significantly

correlate with stress, though once again, their interaction does not. In examining the

variables of attachment, stress, and depression together, the study indicates that stress

best correlates with depressive symptoms, with more research needed to investigate the

role that attachment style plays in this model (see Figure 4).

Furthermore, the study found that attachment style was limited in its usefulness

for assessing healthcare utilization. One analysis revealed a statistically significant

correlation between insecure attachment and daily sleep medication usage, though this

relationship was not clinically significant. The variable of stress, however, yielded more

interesting findings with regards to healthcare utilization. Participants with higher

subjective stress levels reported both increased ER visits in the past 12 months, as well as

increased subjective pain scores. Thus, the study demonstrated that stress was most

associated with aspects of healthcare utilization (see Figure 5). Additional research is

warranted to explore the manner in which attachment style may affect this model.

LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

Overall, the author would argue that the present study filled in several gaps in the attachment literature. The correlation between attachment constructs and depression was better understood, and the prominent role that stress plays in our understanding of healthcare utilization was brought to the forefront. Additionally, the study was able to prospectively obtain considerable medication usage and length of stay data for all 117 enrolled subjects. Despite these achievements, the study also displayed several limitations.

One limitation of this study is the relatively small sample size. The enrollment numbers were large enough for analyses of the primary aims, but lacked sufficient power for the study of insecure attachment subcategories when using Hazan & Shaver's tool – preoccupied attachment in particular. With a larger sample size, it may have been possible to analyze the secondary hypotheses using the Attachment Style Questionnaire and better understand the characteristics of those who were categorized with a preoccupied attachment style.

Furthermore, the study was limited in that it was conducted at one hospital site. Although the patient sample was consistent with the city of Dallas's demographics, this may limit the study's generalizability to other hospital and regional settings. Future research would ideally be multi-centered and include subjects across a range of hospital settings, including patients from rural and suburban populations across the country, which would in turn lead to a greater generalizability of the study's findings. Another limitation of this study was that subjects were required to be able to speak, read, and

write English. Having questionnaires that were validated in Spanish would have

increased the study's generalizability and increased enrollment numbers. Furthermore,

the study did not control for, nor evaluate, subjects' reading level, nor did the author

account for English as a second language. In retrospect, including a short evaluation of

subjects' reading level would have been beneficial.

Additionally, the smaller sample size did not allow us to more tightly account for

medical pathology. Future research in this emerging area of interest would benefit from

an increased sample size that would allow for more rigorous statistical control of medical

complications across attachment styles.

With regard to the study measures, some confusion existed regarding aspects of

the demographic questionnaire. Specifically, parts of the questionnaire related to past

healthcare utilization yielded some contradictory results, such as having visited their

physician more times in the past 3 months than they had in the past 12 months. Future

studies in this area would benefit from longer study tracking period with a larger

population.

Additionally, one might argue that the associations found between attachment

anxiety and depression are not surprising as they are somewhat overlapping constructs.

Indeed, previous research has indicated some confounding of variables between measures

of anxiety and depression (Dobson, 1985). The present study, however, investigated

attachment anxiety, which primarily describes the ways in which one behaves and feels

interpersonally.   For example, one such prompt from the ECR-S reads "My desire to be

very close sometimes scares people away." Such a statement may be indicative of attachment anxiety, but not necessarily the larger, more general construct of anxiety.

Lastly, accounting for medication usage among some subjects presented a limitation. For the purposes of this study, an administration of one dosage of anxiolytic medication, for example, was equivalent to an administration of another dosage of any other one anxiolytic. In this way, all medications were considered equal for all intents and purposes. Clearly, however, the efficacy of one antidepressant in one subject may not be equivalent to a different dosage of another antidepressant in a different subject – this difference is most clearly exemplified with pain medication, where morphine, fentanyl, and the like were treated equally. Hence, any conclusions regarding attachment styles and medication utilization should be examined tentatively. Given that this study was a preliminary exploration into the relationship between attachment style and medication usage, however, this limitation of the study was accepted. Future research would do well to account for these dosing differences, and scale medication usage data accordingly. Additionally, being able to prospectively monitor long-term outpatient medication utilization would be of great value to future research. Though this study found few differences in how the attachment subgroups used medication while at BUMC, it may be the case that significant differences would be observed in long-term medication usage.

FIGURES

Figure 1
Attachment Style using ECR-S Median Splits

High Avoidance

Avoidant   *Fearful*

Low Anxiety ←——————————→ **High Anxiety**

Secure   *Preoccupied*

Low Avoidance

Figure 2
Hypothesis I Proposed Model

Stress

Attachment
Style

Depressive
Symptoms
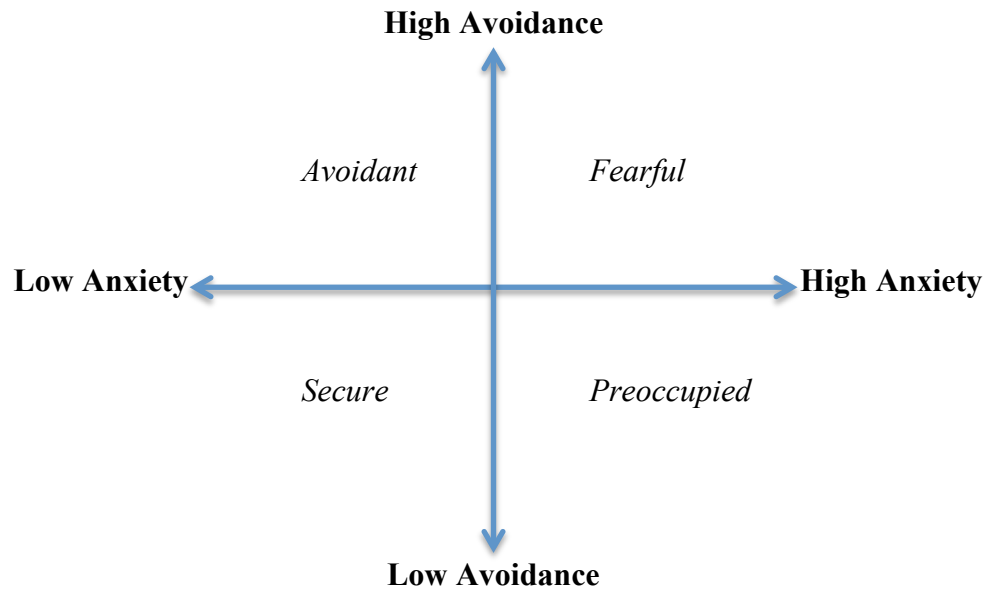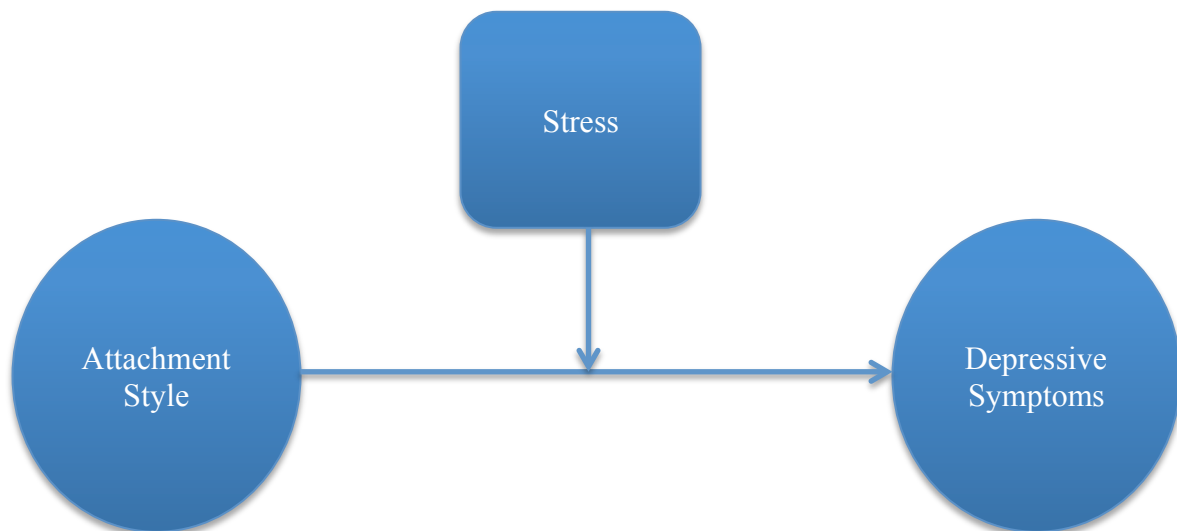
Figure 3
Hypothesis II Proposed Model
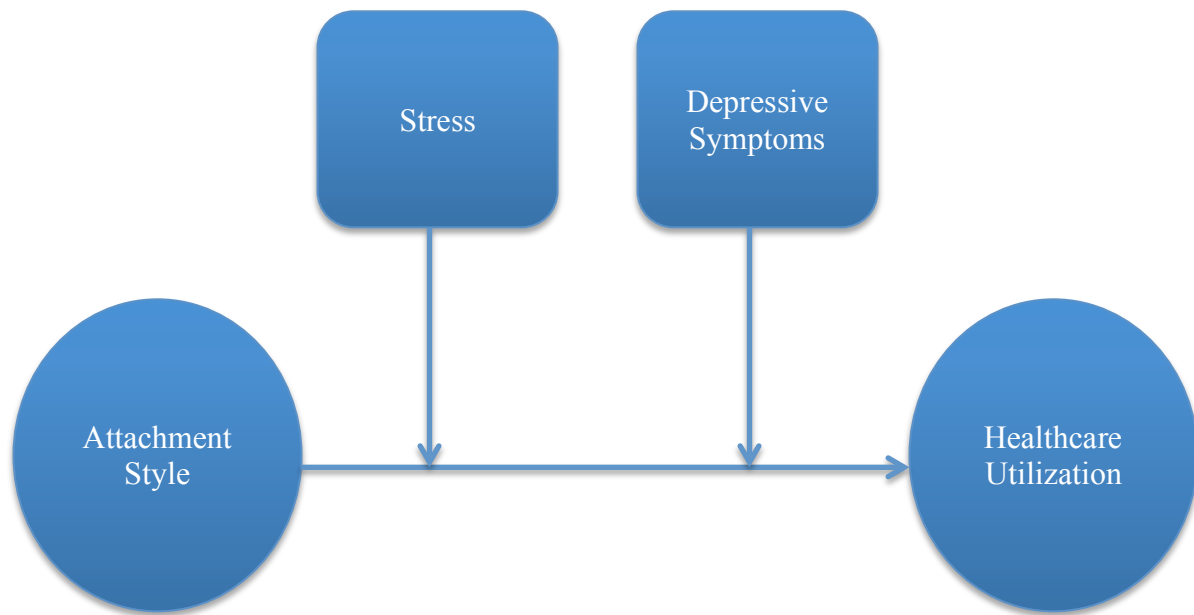
Figure 4
Hypothesis I Revised Model

Figure 5
Hypothesis II Revised Model

TABLES

Table 1
Racial Characteristics of Total Sample (N = 117)

Race/Ethnicity	n	%	Dallas County %
Caucasian	62	53.0	68.3
African-American	50	42.7	23.1
Asian	1	0.9	5.7
American Indian/Alaska Native	4	3.4	1.1
Latino	17	14.5	39.0

Table 2
Demographic Characteristics Overview

Variable	M	SD	Min	Max
Age (years)	29.51	6.59	18.89	45.61
Education (years)	14.46	2.63	9.0	21.0
Weeks Pregnant	27.74	6.90	1.0	37.0

Table 3
Demographics Specifics

Variable	N	%
Marital Status		
Married	58	49.6
Never Married	53	45.3
Divorced	5	4.3
Re-married	1	0.9
Education		
9 – 12 Years	6	5.1
HS or GED	35	29.9
Some College	29	24.8
College Degree	24	20.5
Graduate Work	23	19.7
Pregnancy Trimester		
1st	5	4.3
2nd	36	30.8
3rd	76	65.0

Table 4
Secure v. Insecure Demographics (via ASQ)

Variable	Secure	Insecure	p-values
N	82	35	
Age	29.73 (6.13)	28.98 (7.64)	.055
Years of Education	14.52 (2.65)	14.31 (2.60)	.693
Weeks Pregnant	28.09 (6.33)	26.93 (8.14)	.090

Table 5
Hazan & Shaver's Attachment Style v. EPDS Scores

Attach. Style	N	Mean	Std. Dev.	Sig.
Insecure	35	9.00	5.63	.047*
Dismissive	31	8.81	5.72	
Preoccupied	4	10.50	5.32	
Secure	82	5.71	4.81	
Total Sample	117	6.69	5.62	

Table 6
Model Summary for ECR-S as a Predictor of EPDS Scores

Model	R	R^2	Adj. R^2
1	.467	.218	.197

Table 7
Standardized Subscores of ECR-S as a Predictor of EPDS Scores

Variable	Beta	t	Sig.
Anxiety	.412	4.833	$< .001*$
Avoidance	.146	1.714	.089
Interaction	.038	.461	.645

Table 8
Hazan & Shaver's Attachment Style v. PSS Scores

Attach. Style	N	Mean	Std. Dev.	Sig.
Insecure	35	18.60	7.54	.576
Dismissive	31	18.29	7.90	
Preoccupied	4	21.00	3.16	
Secure	82	13.20	7.58	
Total Sample	117	14.81	7.93	

Table 9
Total Sample ECR-S Scores

Variable	M	SD	Min	Max
Anxiety	2.94	1.07	1.00	5.67
Avoidance	2.23	1.16	1.00	5.17

Table 10
Model Summary for ECR-S as a Predictor of PSS Scores

Model	R	R^2	Adj. R^2
2	.607	.369	.352

Table 11
Standardized Subscores of ECR-S as a Predictor of PSS Scores

Variable	Beta	t	Sig.
Anxiety	.506	6.608	< .001*
Avoidance	.225	2.938	.004*
Interaction	.131	1.750	.083

Table 12
Model Summary for ECR-S as a Predictor of EPDS Scores with Moderators

Model	R	R^2	Adj. R^2
3	.810	.656	.640

Table 13
Standardized Subscores of ECR-S as a predictor of EPDS Scores with Moderators

Variable	Beta	t	Sig.
Anxiety	-.014	-.202	.840
Avoidance	-.026	-.358	.721
PSS	.813	11.54	< .001*
Mod_pss_anx	.039	.637	.526
Mod_pss_avoid	-.013	-.185	.853

Table 14
Bivariate Correlations of PSS Scores & ECR-S Subscores

Variable	Anxiety	Avoidance	PSS Score
Anxiety	1.00	.218 (*p* = .018*)	.554 (*p* < .001*)
Avoidance	--	1.00	.328 (*p* < .001*)
PSS Score	--	--	1.00

Table 15
Healthcare Utilization via Hazan & Shaver's Categories

Variable	Insecure	Secure	p-value
Physician visits in past 12 months	10.69 (10.03)	14.05 (14.21)	.549
Other healthcare visits in past 12 mo.	2.00 (2.90)	2.90 (4.99)	.281
Hospital visits in past 12 months	1.51 (2.48)	2.11 (5.95)	.237
ER visits in past 12 months	1.60 (2.32)	1.68 (2.35)	.931
Pain Score	1.43 (2.51)	1.43 (2.51)	.250
Days at BUMC	15.17 (22.20)	13.63 (16.29)	.256
Pain meds/day	1.36 (1.64)	1.24 (1.35)	.475
Sleep meds/day	.19 (.45)	.08 (.26)	< .001*
Anxiety meds/day	.001 (.003)	.021 (.106)	.021*

Healthcare Cont.

Depression meds/day	.029 (.169)	.012 (.110)	.217

Table 16
ECR-S Scores & Health Outcomes via MANOVA

Effect	Value	F	Hyp df	Error df	Sig.	η^2
Anxiety Λ	.928	.809	10	104	.620	.072
Avoid. Λ	.855	1.766	10	104	.076	.145
Int. Λ	.923	.863	10	104	.570	.077

Table 17
ECR-S Scores w/PSS & Health Outcomes via MANOVA

Effect	Value	F	Hyp df	Error df	Sig.	η^2
Anxiety Λ	.878	1.426	10	103	.179	.122
Avoid. Λ	.901	1.133	10	103	.345	.099
Int. Λ	.932	.755	10	103	.671	.068
PSS Λ	.829	2.131	10	103	.028*	.171

Table 18
PSS Test of Between-Subject Effects

Variable	df	Mean Sq.	F	Sig.	η^2
MD Visits	1	52.54	.300	.585	.003
Other Visits	1	3.22	.156	.693	.001
Hosp. Visits	1	73.62	2.77	.099	.024
ER Visits	1	55.56	11.48	< .001*	.093
Pain Score	1	27.39	5.19	.025*	.044
LOS	1	517.10	1.56	.214	.014
Pain Meds	1	4.14	2.10	.150	.018
Sleep Meds	1	.135	1.46	.230	.013
Anx. Meds	1	.005	.58	.449	.005
Dep. Meds	1	.006	.36	.552	.003

Table 19
ECR-S Scores w/EPDS & Health Outcomes via MANOVA

Effect	Value	F	Hyp df	Error df	Sig.	η^2
Anxiety Λ	.942	.718	9	104	.692	.058
Avoid. Λ	.873	1.674	9	104	.105	.127
Int. Λ	.928	.891	9	104	.536	.072
EPDS Λ	.904	1.222	9	104	.290	.096

Table 20
Dismissive v. Preoccupied Attachment Styles & LOS via ASM

Attach. Style	N	Mean	Std. Dev.	Sig.
Dismissive	31	15.61	23.55	.153
Preoccupied	4	11.75	4.65	

Table 21
Secure v. Preoccupied Attachment Styles & LOS via ASM

Attach. Style	N	Mean	Std. Dev.	Sig.
Secure	82	13.63	16.29	.180
Preoccupied	4	11.75	4.65	

Table 22
Attachment Styles Defined in a MANOVA Through Their Partial η Values

Attachment Style	Anxiety Score	Avoidance Score	Interaction
Secure	negative	negative	positive
Preoccupied	positive	negative	negative
Avoidant	negative	positive	negative
Fearful	positive	positive	positive

Table 23
Dismissive v. Preoccupied Attachment Styles & EPDS Scores

Attach. Style	N	Mean	Std. Dev.	Sig.
Dismissive	31	8.81	5.72	.793
Preoccupied	4	10.50	5.32	

Table 24
Secure v. Preoccupied Attachment Styles & EPDS Scores

Attach. Style	N	Mean	Std. Dev.	Sig.
Secure	82	5.71	4.81	.584
Preoccupied	4	10.50	5.32	

Table 25
Hazan & Shaver's Attachment Styles v. Pain Scores

Attach. Style	N	Mean	Std. Dev.	Sig.
Insecure	35	1.43	2.51	.250
Dismissive	31	1.19	2.29	
Preoccupied	4	3.25	3.78	
Secure	82	1.05	2.31	
Total Sample	117	1.16	2.37	

APPENDIX A
Baylor Internal Review Board Approval

BAYLOR
Research Institute

Affiliated with Baylor Health Care System

IRB Approval – Expedited Review of New Study

To: Claude Allen Stringer, MD

Copy to: Hannah Cassedy, MA, Richard Enander

Date: July 30, 2014

Re: 014-147
Attachment Style, Depression, and Health Outcomes Among
Antepartum Patients
Reference Number: 077865

Your new proposal was reviewed by a designated member of Baylor IRB Red via expedited review.

This study was determined to be eligible for expedited review as it involves no greater than minimal risk to the subjects and fits into the following category(ies) from the 1998 approved list:
Category 5: Research involving materials (data, documents, records, or specimens) that have been collected, or will be collected solely for nonresearch purposes (such as medical treatment or diagnosis)
Category 7: Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies

This review included the following components:

Study Application	
Form Name	**Outcome**
Study Application - Review by BRI IRB	Approved as Presented

Study Document			
Title	**Version Number**	**Version Date**	**Outcome**
Form 1.1	Version 1.1	07/29/2014	Approved
Protocol 1.1	Version 1.1	07/02/2014	Approved
perceived stress scale	Version 1.0	07/16/2014	Approved

hazan and shaver	Version 1.0	07/16/2014	Approved
ecr-s form	Version 1.0	07/16/2014	Approved
edinburgh	Version 1.0	07/16/2014	Approved
crowne-marlowe	Version 1.0	07/16/2014	Approved
form 35 - signed	Version 1.0	07/16/2014	Approved
form 34 - signed	Version 1.0	07/16/2014	Approved
form 18 - signed	Version 1.0	07/16/2014	Approved
demographics questionnaire	Version 1.0	07/16/2014	Approved
data log 2 - demographics and scores	Version 1.0	07/16/2014	Approved
data log 1 - identifying information	Version 1.0	07/16/2014	Approved

Study Consent Form			
Title	**Version Number**	**Version Date**	**Outcome**
Consent Form	Version 1.2	07/29/2014	Approved

Your submission has been approved. The approval period begins on 07/30/2014 and expires on 07/29/2015. Your next continuing review is scheduled for 06/15/2015.

This study is approved to be conducted at the following locations:
Baylor University Medical Center, Hob, BUMC-Hob 3
Baylor University Medical Center, Jonsson, BUMC-Jonsson 7

The following individuals are approved as key study personnel (research team members & administrative support):

Informed consent must be obtained utilizing the document(s) as listed above. You must utilize a copy of the consent which includes the IRB approval stamp. Therefore, you will need to print new copies from the database which include the IRB approval stamp.

Cassedy, Hannah, MA; Enander, Richard; Frank, Blake A., PhD; Miltenberger, Paula Bosler, PhD; Pitts, Sandra, PhD; Robinson, Richard Christian, PhD; Stringer, Claude Allen, MD; Tucker, Christy
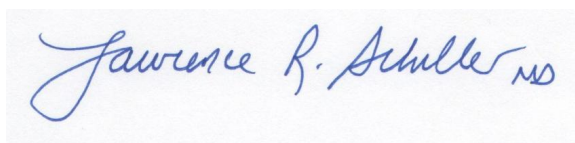
All events that occur on this study including protocol deviations, serious adverse events, unanticipated problems involving risks to subjects/others, subject complaints or other similar events must be reported to the IRB in accordance with the respective policies.

Remember that this study is approved to be conducted as presented. Any revisions to this proposal and/or any of the referenced documents must be approved by the IRB prior to being implemented. Additionally, if you wish to begin using any new documents, these must receive IRB approval prior to implementation of them in the study.

IRB approval may not be the final approval needed to begin the study. All contractual, financial or other administrative issues must be resolved through Baylor Research Institute prior to beginning your study.

If you need additional assistance, please contact the IRB Specialist at 214-820-9989.

Sincerely,

Lawrence R. Schiller MD

Signature applied by Lawrence R. Schiller on 07/30/2014 11:59:24 PM CDT

APPENDIX B
Letter of Consent

IRB Project Number 014-147   11/20/14

BAYLOR RESEARCH INSTITUTE
Baylor University Medical Center
Dallas, Texas

PARTICIPATION EXPLANATION AND CONSENT FORM

PROJECT TITLE: Attachment Style, Depression, and Health Outcomes Among
Antepartum Patients

INVESTIGATORS: ClaudeStringer, MD
Richard Robinson, PhD
H.M. Evans, PhD
Christy Tucker, PhD
Blake Frank, PhD
Sandra Pitts, PhD
Paula Miltenberger, PhD
Richard Enander, MS
Hannah Cassedy, MA
KenleighRoden-Foreman, BA

TELEPHONE NUMBER: 214-370-1300

INTRODUCTION:

Before you say that you will be in this research study you need to read this form. It is important for you to understand all the information in this form. This form will tell you what the study is about and how it will be done. It will tell you about some problems that might happen during the study. It will also tell you about the good things that might happen for you during the study. When you read a paper like this to learn about a clinical trial it is called "informed consent." The people who are doing this research study are giving you very important information about the study. When you give your consent for something, it is the same as giving your permission. This consent form may contain words that you do not understand. Please talk with someone from the research staff if you have questions. Do not sign this consent form unless all yourquestions have been answered and you feel comfortable with the information you have read. You will be given a copy of the form to keep.

You are being asked to take part in this study because you are a patient atBaylor University Medical Center's pregnancy unit.

Why Is This Study Being Done?

The purpose of this study is to examine the associations between depression, stress, relationship styles, and health outcomes in a pregnant population.

Page 1 of 5   IRB NUMBER: 014-147
IRB APPROVAL DATE: 11/21/2014   Subject's Initials_____
IRB EXPIRATION DATE: 07/29/2015

How Many People Will Take Part In The Study?

About 200people will take part in this study worldwide/nationwide. About 200of these people will take part at this location.

What Is Involved In The Study?

You will be asked to allow the researcher to review your medical records and copy the information from these records into your research chart for this project. This information will be reviewed by the researcher and his/her staff to answer the specific question as outlined above.

You will be asked to complete sixquestionnaires which will ask you questions about the quality of your relationshipsand any depressive symptoms you may be experiencing. These questionnaires will take about 30 minutes to complete. Once you have completed these questionnaires you will give them to the researcher or his/her staff so that they can review them for their research report.

How Long Will I Be In The Study?

You will be in the study for one day, for a total duration of 30 minutes**.**

The researcher may decide to take you off the study if s/he feels that it is in your best interest, if you are not able to follow the rules of the study, if the study is stopped before it is finished or if new information becomes available that indicates it would be best for you to stop being in the study.

You can stop taking part in this study at any time. If you decide to stop taking part in the study, you should let the researcher or his/her staff know so that they can make sure you are safely taken out of the study.

What Are The Risks, Benefits and Options of The Study?

There are no risks or benefits to you for being in the study. We hope that what we learn in this study will help others with your condition in the future. Your other option is to not be in the study.

What About Confidentiality?

You have a right to privacy. This means that all the information about you from this study will only be shown to the people working on the study. The results of this study may be published in a scientific book or journal. If this is done, your name will not be used. All information about you from this research project will be kept in a locked office or other locked area. Information that is kept on computers will be kept safe from access by people who should not see it.

IRB NUMBER: 014-147
IRB APPROVAL DATE: 11/21/2014   Subject's Initials_____
IRB EXPIRATION DATE: 07/29/2015

The privacy law requires that Baylor Research Institute get your permission before giving any of your health information to other people. There are people who need to review your information to make sure the study is done correctly. These people may look at or copy your information while they are doing this review. When you sign this form you give permission to Baylor Research Institute to give other people information about your health as needed for the research project. These groups include people who work for Baylor Research Institute (including the Institutional Review Board), the US Food and Drug Administration, the Office for Human Research Protections and the Association for the Accreditation of Human Research Protection Programs. This also includes the following groups of people who are working with the sponsor of the study: not applicable. Even though we usually remove your name from the information, the people who get this information may be able to figure out who you are. The kinds of health information that might be given to these people include results from the surveys you complete, notes from the doctor doing the research or other similar events.

This also might be information about diseases like Human Immunodeficiency Virus ("HIV") or Acquired Immune Deficiency Syndrome ("AIDS"), or information about mental illness (except for specific notes of psychotherapy sessions) and drug or alcohol abuse.

You do not have to give this permission and it is all right to refuse to sign this form. Your doctor will still treat you and your insurance company will still pay your medical bills (according to their policy) even if you do not give your permission for us to release this information. However, since it is important for the people listed above to have access to your information, if you do not sign this form, you cannot be in the research study.

If you give permission to Baylor Research Institute to give other people information about your health and the other people are not part of the group that must obey this law, your health information will no longer be protected by the privacy law. However, we will take all reasonable measures to protect your information from being misused.

If you change your mind and later want to withdraw your permission, you may do so. You must notify Baylor Research Institute in writing at 3310 Live Oak, Suite 501, Dallas, TX 75204. If you decide to do this, it will not apply to information that was given before you withdrew your permission and you will no longer be able to take part in the study.

You may not be allowed to look at your health information during this study. However, at a later time, you will be able to look at this information. This later time will be sometime after the study is completed.

Unless permission is withdrawn, this permission will not expire at the end of the study.

What Are the Costs and Will I be Paid?

There are no costs to you for being in the study and you will not be paid for being in the study.

What are My Rights As a Participant?

IRB NUMBER: 014-147
IRB APPROVAL DATE: 11/21/2014
IRB EXPIRATION DATE: 07/29/2015

Subject's Initials_____

IRB Project Number 014-147   11/20/14

Taking part in this study is voluntary. You may choose not to take part or may leave the study at any time. If you agree to take part and then decide against it, you can withdraw for any reason. Deciding not to be in the study, or leaving the study early, will not result in any penalty or loss of benefits that you would otherwise receive.

We will tell you about any new information that may affect your health, welfare, or willingness to stay in this study.

All of the people working on the project must be careful not to carelessly harm you. If you are hurt during this project, you have the right to seek legal counsel. Nothing in this consent form takes away that right if you are hurt during this research.

Whom Do I Call If I have Questions or Problems?

If you have concerns, complaints or questions about the study or have a research-related injury, contact the Principal Investigator, Dr. Claude Stringerat 214-370-1300.If you are unable to reach Dr. Claude Stringerand require further assistance, please contact the Baylor University Medical Center's front desk at 214-820-0111.

For concerns, complaints or questions about your rights as a research subject or if you simply wish to speak with someone who is not a part of the research staff, contact Lawrence R. Schiller, M.D., IRB Chair, at 214-820-2687.

- This Space Left Intentionally Blank -

IRB NUMBER: 014-147
IRB APPROVAL DATE: 11/21/2014
IRB EXPIRATION DATE: 07/29/2015

Subject's Initials_____

IRB Project Number 014-147   11/20/14

Statement of Person Obtaining Consent:

I have explained to _____ the purpose of the research project, the procedures required and the possible risks and benefits to the best of my ability. They have been encouraged to ask questions related to taking part.

_____   _____   _____
Signature of Person Obtaining Consent   Date   Time

Confirmation of Consent by Research Subject:

You are making a decision about being in this research study. You will be asked to give your written consent if you want to be in the study. Giving consent is like giving permission. You should not give your permission to be in this study until you have read and understood all the pages in this form. If you cannot read, then someone can read the form to you. Make sure that all your questions about this research project have been answered before you sign this form. When you sign this form, you are giving your permission to be in the study. By signing this form, you have not given up any of your legal rights or released anyone from liability for negligence.

_____ has explained to me the purpose of the research project, the study procedures that I will have, and the possible risks and discomforts that may happen. I have read (or have been read) this consent form. I have been given a chance to ask questions about the research study and the procedures involved. I believe that I have enough information to make my decision. I have also been told my other options. To the best of my knowledge, I am not in any other medical research. Therefore, I agree to give my consent to take part as a subject in this research project.

_____   _____   _____
Signature of Subject   Date   Time

Subject's Initials_____

APPENDIX C
Measures

Demographics Questionnaire

<u>Demographics Questionnaire</u>

1. How many years of education do you have?_____

2. How many weeks pregnant are you?_____

3. What is your marital status?
   ☐ Married
   ☐ Widowed
   ☐ Divorced
   ☐ Never Married

4. Please indicate your race:
   ☐ American Indian or Alaska Native
   ☐ Asian
   ☐ Black or African American
   ☐ Native American or Other Pacific Islander
   ☐ White

5. Please indicate your ethnicity:
   ☐ Hispanic or Latino
   ☐ Not Hispanic or Latino

For the following questions, please provide as specific a number as possible.

6. How many times have you visited a physician (current stay not included). . .
   . . . since you became pregnant? _____
   . . . in the past 3 months? _____
   . . . in the past 12 months? _____

7. How many times have you visited another health provider (ex. mental healthcare, chiropractor, dentist, etc.). . .
   . . . since you became pregnant? _____
   . . . in the past 3 months? _____
   . . . in the past 12 months? _____

8. How many nights have you spent in the hospital (current stay not included). . .
   . . . since you became pregnant? _____
   . . . in the past 3 months? _____
   . . . in the past 12 months? _____

9. How many times have you visited the ER. . .
   . . . since you became pregnant? _____
   . . . in the past 3 months? _____
   . . . in the past 12 months? _____

Attachment Style Questionnaire

Scale:

These questions are concerned with your experiences in romantic love relationships. Take a moment to think about these experiences and answer the following questions with them in mind.

Read each of the three self-descriptions below (A, B, and C) and then place a checkmark next to the single alternative that best describes how you feel in romantic relationships or is nearest to the way you feel. (Note: The terms "close" and "intimate" refer to psychological or emotional closeness, not necessarily to sexual intimacy.)

_____A. I am somewhat uncomfortable being close to others; I find it difficult to trust them completely, difficult to allow myself to depend on them. I am nervous when anyone gets too close, and often, others want me to be more intimate than I feel comfortable being.

_____B. I find it relatively easy to get close to others and am comfortable depending on them and having them depend on me. I don't worry about being abandoned or about someone getting too close to me.

 _____C. I find that others are reluctant to get as close as I would like. I often worry that my partner doesn't really love me or won't want to stay with me. I want to get very close to my partner, and this sometimes scares people away.

Experiences in Close Relationships Scale-Short Form (ECR-S)

Instruction: The following statements concern how you feel in romantic relationships. We are interested in how you generally experience relationships, not just in what is happening in a current relationship. Respond to each statement by indicating how much you agree or disagree with it. Mark your answer using the following rating scale:

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree

1. It helps to turn to my romantic partner in times of need.

2. I need a lot of reassurance that I am loved by my partner.

3. I want to get close to my partner, but I keep pulling back.

4. I find that my partner(s) don't want to get as close as I would like.

5. I turn to my partner for many things, including comfort and reassurance.

6. My desire to be very close sometimes scares people away.

7. I try to avoid getting too close to my partner.

8. I do not often worry about being abandoned.

9. I usually discuss my problems and concerns with my partner.

10. I get frustrated if romantic partners are not available when I need them.

11. I am nervous when partners get too close to me.

12. I worry that romantic partners won't care about me as much as I care about them.

Wei, M., Russell, D. W., Mallinckrodt, B., & Vogel, D. L. (2007). The experiences in Close Relationship Scale (ECR)-Short Form: Reliability, validity, and factor structure. *Journal of Personality Assessment, 88*, 187-204.

Social Desirability Scale

Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide whether the statement is *true* or *false* as it pertains to you personally.

1. T F Before voting I thoroughly investigate the qualifications of all the candidates.
2. T F I never hesitate to go out of my way to help someone in trouble.
3. T F It is sometimes hard for me to go on with my work if I am not encouraged.
4. T F I have never intensely disliked anyone.
5. T F On occasions I have had doubts about my ability to succeed in life.
6. T F I sometimes feel resentful when I don't get my way.
7. T F I am always careful about my manner of dress.
8. T F My table manners at home are as good as when I eat out in a restaurant.
9. T F If I could get into a movie without paying and be sure I was not seen, I would probably do it.
10. T F On a few occasions, I have given up something because I thought too little of my ability.
11. T F I like to gossip at times.
12. T F There have been times when I felt like rebelling against people in authority even though I knew they were right.
13. T F No matter who I'm talking to, I'm always a good listener.
14. T F I can remember "playing sick" to get out of something.
15. T F There have been occasions when I took advantage of someone.
16. T F I'm always willing to admit it when I make a mistake.
17. T F I always try to practice what I preach.
18. T F I don't find it particularly difficult to get along with loudmouthed, obnoxious people.
19. T F I sometimes try to get even rather than forgive and forget.
20. T F When I don't know something I don't at all mind admitting it.
21. T F I am always courteous, even to people who are disagreeable.
22. T F At times I have really insisted on having things my own way.
23. T F There have been occasions when I felt like smashing things.
24. T F I would never think of letting someone else be punished for my wrong-doings.
25. T F I never resent being asked to return a favor.
26. T F I have never been irked when people expressed ideas very different from my own.
27. T F I never make a long trip without checking the safety of my car.
28. T F There have been times when I was quite jealous of the good fortune of others
29. T F I have almost never felt the urge to tell someone off.
30. T F I am sometimes irritated by people who ask favors of me.
31. T F I have never felt that I was punished without cause.
32. T F I sometimes think when people have a misfortune they only got what they deserved.
33. T F I have never deliberately said something that hurt someone's feelings.

Edinburgh Postnatal Depression Scale

Edinburgh Postnatal Depression Scale[1] (EPDS)

Name: _____   Address: _____

Your Date of Birth: _____   _____

Baby's Date of Birth: _____   Phone: _____

As you are pregnant or have recently had a baby, we would like to know how you are feeling. Please check the answer that comes closest to how you have felt **IN THE PAST 7 DAYS**, not just how you feel today.

Here is an example, already completed.

I have felt happy:
- ☐ Yes, all the time
- ☒ Yes, most of the time   This would mean: "I have felt happy most of the time" during the past week.
- ☐ No, not very often   Please complete the other questions in the same way.
- ☐ No, not at all

In the past 7 days:

1. I have been able to laugh and see the funny side of things
   - ☐ As much as I always could
   - ☐ Not quite so much now
   - ☐ Definitely not so much now
   - ☐ Not at all

2. I have looked forward with enjoyment to things
   - ☐ As much as I ever did
   - ☐ Rather less than I used to
   - ☐ Definitely less than I used to
   - ☐ Hardly at all

*3. I have blamed myself unnecessarily when things went wrong
   - ☐ Yes, most of the time
   - ☐ Yes, some of the time
   - ☐ Not very often
   - ☐ No, never

4. I have been anxious or worried for no good reason
   - ☐ No, not at all
   - ☐ Hardly ever
   - ☐ Yes, sometimes
   - ☐ Yes, very often

*5 I have felt scared or panicky for no very good reason
   - ☐ Yes, quite a lot
   - ☐ Yes, sometimes
   - ☐ No, not much
   - ☐ No, not at all

*6. Things have been getting on top of me
   - ☐ Yes, most of the time I haven't been able to cope at all
   - ☐ Yes, sometimes I haven't been coping as well as usual
   - ☐ No, most of the time I have coped quite well
   - ☐ No, I have been coping as well as ever

*7 I have been so unhappy that I have had difficulty sleeping
   - ☐ Yes, most of the time
   - ☐ Yes, sometimes
   - ☐ Not very often
   - ☐ No, not at all

*8 I have felt sad or miserable
   - ☐ Yes, most of the time
   - ☐ Yes, quite often
   - ☐ Not very often
   - ☐ No, not at all

*9 I have been so unhappy that I have been crying
   - ☐ Yes, most of the time
   - ☐ Yes, quite often
   - ☐ Only occasionally
   - ☐ No, never

*10 The thought of harming myself has occurred to me
   - ☐ Yes, quite often
   - ☐ Sometimes
   - ☐ Hardly ever
   - ☐ Never

Administered/Reviewed by _____   Date _____

[1]Source: Cox, J.L., Holden, J.M., and Sagovsky, R. 1987. Detection of postnatal depression: Development of the 10-item Edinburgh Postnatal Depression Scale.   *British Journal of Psychiatry* 150:782-786 .

[2]Source: K. L. Wisner, B. L. Parry, C. M. Piontek, Postpartum Depression N Engl J Med vol. 347, No 3, July 18, 2002, 194-199

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Perceived Stress Scale

Perceived Stress Scale

The questions in this scale ask you about your feelings and thoughts **during the last month**. In each case, you will be asked to indicate by circling *how often* you felt or thought a certain way.

Name _____ Date _____

Age _____ Gender (*Circle*): **M   F**   Other _____

0 = Never   1 = Almost Never   2 = Sometimes   3 = Fairly Often   4 = Very Often

1. In the last month, how often have you been upset
   because of something that happened unexpectedly?.................................. 0   1   2   3   4

2. In the last month, how often have you felt that you were unable
   to control the important things in your life? 0   1   2   3   4

3. In the last month, how often have you felt nervous and "stressed"? 0   1   2   3   4

4. In the last month, how often have you felt confident about your ability
   to handle your personal problems? 0   1   2   3   4

5. In the last month, how often have you felt that things
   were going your way?... 0   1   2   3   4

6. In the last month, how often have you found that you could not cope
   with all the things that you had to do? 0   1   2   3   4

7. In the last month, how often have you been able
   to control irritations in your life?... 0   1   2   3   4

8. In the last month, how often have you felt that you were on top of things?.. 0   1   2   3   4

9. In the last month, how often have you been angered
   because of things that were outside of your control?............................. 0   1   2   3   4

10. In the last month, how often have you felt difficulties
    were piling up so high that you could not overcome them? 0   1   2   3   4

Please feel free to use the *Perceived Stress Scale* for your research.

Mind Garden, Inc.
info@mindgarden.com
www.mindgarden.com

References
The PSS Scale is reprinted with permission of the American Sociological Association, from Cohen, S., Kamarck, T., and Mermelstein, R. (1983). A
  global measure of perceived stress. *Journal of Health and Social Behavior, 24*, 386-396.
Cohen, S. and Williamson, G. Perceived Stress in a Probability Sample of the United States. Spacapan, S. and Oskamp, S. (Eds.) *The Social
  Psychology of Health*. Newbury Park, CA: Sage, 1988.

APPENDIX D
Additional Analyses

Much of the previous analyses dealt with the continuous data provided by the ECR-S tool. Though Hazan and Shaver's measure was employed as well, the Attachment Style Questionnaire lacked sufficient power for analysis of the insecurely attached subgroups, particularly with the preoccupied individuals. Thus, in order to further examine the participants categorically, the ECR-S subscores were dichotomized through median split analysis. Previous literature has argued against this technique, as it tends to result in a loss of statistical power, particularly for participants whose scores lie closer the median (MacCallum, Zhang, Preacher, & Rucker, 2002). With this in mind, the following analyses were not included in the study's main findings, but are rather presented here for further consideration.

Demographic Data

In addition to using Hazan and Shaver's tool to categorically classify subjects according to their attachment style, the ECR-S was utilized in the analyses. To categorize subjects using this continuous measure, median split analysis was employed. For the purposes of examining client demographics, the subscales of the ECR-S were categorically split across their median values (Streiner, 2012). Descriptive analysis revealed the median value of the anxiety subscore to be 2.83, and the median avoidant subscore was 1.83. Subjects whose values were below the median value on both

subscales were categorized as *secure*; all other subjects were categorized as *insecure*.

Re-analyzing the data presented in Table 1D using median splits leads to Table 1D.

Insert Table 1D

Of the 117 enrolled patients, 43 were categorized as secure, and 74 were labeled insecure. Comparing the two groups, the study found that the securely attached participants have a mean age of 30.76 years (*SD* = 5.11) and the insecurely attached subjects have a mean age of 28.77 years (*SD* = 7.25, *p* = .004). The securely attached individuals have a mean of 15.12 years of education (*SD* = 2.68) compared to 14.08 years of education for their insecurely attached counterparts (*SD* = 2.53, *p* = .557). Lastly, the securely attached patients were, on average, 27.74 weeks pregnant at time of enrollment (*SD* = 7.26), whereas the insecurely attached subjects were 27.74 weeks pregnant (*SD* = 6.74, *p* = .430).

The data reveal that the demographic variable of age was significantly different between the two groups (though not clinically significant), whereas years of education and time pregnant were not. Although in this case utilizing median splits did not provide a significantly different clinical picture, this method will be employed in the analyses to come to examine whether the categorical attachment tool (Attachment Style Questionnaire) provides information that is different from the continuous attachment tool (ECR-S).

Hypothesis I.a: Insecurely attached patients will collectively obtain higher scores on a

measure of depressive symptomatology than securely attached subjects.

The study made use of the ECR-S via median split analysis. The subscales of the

ECR-S were categorically split across their median values. Subjects whose values were

below the median value on both subscales were categorized as *secure*; subjects whose

values were below the median score for anxiety but above the avoidant median were

categorized as *dismissive*; subjects whose values were above the median score for anxiety

but below the median of avoidance were categorized as *preoccupied;* subjects whose

values were below both median scores were classified as *fearful*.

Insert Table 2D

As can be seen from Table 2E, a significant difference was observed in how the

43 securely attached patients (*M* = 4.67, *SD* = 3.97) scored on the EPDS versus the 74

insecurely attached patients (*M* = 7.86, *SD* = 5.58, *p* = .006). To better understand the

significance between the secure and insecure groups, a comparison of all four sub-groups

was conducted via a one-way ANOVA with Tukey's post hoc analyses.

Insert Table 3D

The data reveal that there was a significant effect of attachment style on EPDS

score at the p < .05 level for the four attachment styles (*F*(3, 113) = 8.19, *p* < .001). Post

hoc comparisons using the Tukey HSD test indicated that the mean score for the fearful

group ($M = 9.94$, $SD = 5.51$) was significantly different from the securely attached group

($M = 4.67$, $SD = 3.97$, $p < .001$), and from the dismissive group ($M = 5.57$, $SD = 3.92$, $p =$

.006). There were no other observed differences between the four subgroups. Thus, the

original difference between the secure and insecure groups appears to have been driven

entirely by the fearful subgroup.

Insert Table 4D

Levine's test for equality of variances was found to be violated for the present

analysis, however ($F(3, 113) = 3.79$, $p = .012$). Thus, at the α = .05 level of significance,

there is not enough evidence to conclude that not all of the variances are equal. As a

result, Welch's test was utilized, ($F(3, 46.20) = 7.48$, $p < .001$), indicating that a

significant difference did exist between the attachment styles and depressive symptoms

after accounting for the differences in variance.

Insert Tables 5D & 6D

Hypothesis I.b: Insecurely attached patients will collectively obtain higher scores on a measure of perceived stress than securely attached subjects.

ECR-S data were utilized once again to once again make use of median split analysis. Comparing the securely attached subjects with the collective insecurely attached subjects using ECR-S median splits provides the data found in Table 7D.

Insert Table 7D

As can be seen from the table, there was a significant difference in how the securely attached patients responded to the PSS versus the insecurely attached patients when utilizing median split analysis. The 74 insecurely attached patients on average scored a 17.18 on the PSS ($SD = 8.18$), and the 43 securely attached patients had a mean score of 10.74 ($SD = 5.55, p < .001$). In order to better understand the significance between the secure and insecure groups, a comparison of all four sub-groups was conducted via a one-way ANOVA with Tukey's post hoc analyses.

Insert Table 8D

The data reveal that there was a significant effect of attachment style on PSS score at the p < .05 level for the four attachment styles ($F(3, 104) = 19.36, p < .001$). Post hoc comparisons using the Tukey HSD test indicated that the scores for the fearful group ($M = 21.43, SD = 7.15$) were significantly different from the securely attached

group ($M = 10/74$, $SD = 5.55$, $p < .001$), from the preoccupied group ($M = 13.13$, $SD = 7.92$, $p < .001$), and from the dismissive group ($M = 13.52$, $SD = 6.76$, $p < .001$). There were no other observed differences between the four subgroups. Thus, the original difference between the secure and insecure groups appears to have been driven entirely by the fearful subgroup.

Insert Table 9D

Hypothesis I.c: Stress will serve as a moderating variable between attachment style and severity of depressive symptomatology.

The ECR-S data was further employed to once again examine the subgroupings produced by median split analysis. A one-way ANCOVA was conducted to determine if a statistically significant difference existed between attachment styles on depressive scores when moderating with perceived stress.

Insert Table 10D

Table 10D demonstrates that there is not a significant effect of attachment style on EPDS scores after controlling for PSS scores ($F(3, 113) = .757$, $p = .520$). Furthermore, it appears as though stress is not a moderator, but rather a predictor itself of depressive scores ($F(1, 113) = 158.63$, $p < .001$).

Hypothesis II.a: Insecurely attached participants will utilize healthcare at greater levels

than securely attached patients.

The study analyzed the data using the ECR-S median split categories. A

comparison of all four groups was conducted via a one-way ANOVA with Tukey's post

hoc analyses.

Insert Tables 11D & 12D

From the tables, it is evident that there was a significant effect of attachment style

on sleep medications per day at the $p < .05$ level for the four attachment styles ($F(3, 113)$

$= 2.74, p = .047$). There was not a significant effect of attachment style on physician

visits in the past 12 months ($F(3, 113) = .674, p = .570$), other healthcare visits in the past

12 months ($F(3, 113) = .509, p = .677$), hospital visits in the past 12 months ($F(3, 113) =$

1.86, $p = .141$), ER visits in the past 12 months ($F(3, 113) = 2.47, p = .067$), pain score

($F(3, 113) = .645, p = .587$), hospital length of stay ($F(3, 113) = .748, p = .526$), pain

medications per day ($F(3, 113) = 1.24, p = .298$), anxiety medications per day ($F(3, 113)$

$= .345, p = 793$), nor depression medications per day ($F(3, 113) = 1.60, p = .193$).

Post hoc comparisons using the Tukey HSD test indicated that for sleep

medications per day, there were no significant pairwise differences between the four

groups. It is likely the case that the more sensitive ANOVA above detected a difference

in sleep medication usage across attachment style, but that this difference is a type I error.

Insert Table 13D

Hypothesis II.b: Stress will serve as a moderating variable between attachment style and level of healthcare utilization.

To further understand the role that stress plays in the role of healthcare utilization, PSS stress scores were dichotomized using median splits into *high* and *low* subgroups, and a MANOVA was employed against the previously measured health outcomes.

Insert Table 14D

The median split analysis revealed that stress was not significantly correlated with the nine healthcare outcomes ($F(9, 107) = 1.42$, $p = .189$, Wilk's $\Lambda = .893$, partial $\eta^2 = .107$) when analyzed in this manner.

Hypothesis III.a: Individuals with preoccupied attachment styles will have longer lengths of stay than dismissive or securely attached patients.

Making use of median split analyses, the data provided in Tables 15D & 16D was generated via independent samples t-tests.

Insert Tables 15D & 16D

In comparing those with preoccupied attachment ($M = 15.81$, SD $= 17.23$) to those with dismissive attachment ($M = 17.30$, SD $= 21.71$), no significant difference ($p = .822$) was found. Similarly, there was no significant difference observed between the preoccupied group and the secure group ($M = 14.65$, SD $= 8.94$, $p = .778$). A comparison of all four groups was conducted via a one-way ANOVA with Tukey's post hoc analyses.

Insert Table 17D

It was observed that there was not a significant difference of attachment style on days spent at the hospital at the p $< .05$ level for the four conditions ($F(3, 113) = .748$, $p = .526$). As no significant differences were found amongst the groups, the results of the post hoc are not presented here.

In order to better supplement the ANOVA analysis above, the Social Desirability Scale data was employed as well. In the first subsequent analysis, subjects with scores of 20 or greater were excluded. Re-running the data with this exclusion criteria provided the following table:

Insert Table 18D

After excluding 80 subjects based on their social desirability score, it was seen that there was not a significant difference of attachment style on days spent at the hospital at the p $< .05$ level for the four conditions ($F(3, 33) = .209$, $p = .890$). It should be noted,

however, that the majority of cases were thus excluded ($n = 37$) and the power of the analysis was reduced significantly.

In order to retain sufficient power and keep the total N unchanged, rather than using CM scores to exclude subjects, the study sought to analyze the social desirability scale for possible moderation effects. First, regression analysis was utilized using the avoidance, anxiety, and CM scores as the predictors and length of stay as the outcome.

Insert Tables 19D & 20D

The above tables demonstrate that the proposed model does not adequately account for the variance in hospital length of stay ($R^2 = .019$, $F(3, 113) = .735$, $p = .533$). Looking at the variables independently, it can be seen that neither the anxiety subscale ($b = -.079$, $t = -.787$, $p = .433$), the avoidance subscale ($b = .103$, $t = 1.074$, $p = .285$), nor the CM scores ($b = .055$, $t = .561$, $p = .576$) were significantly correlated with hospital length of stay.

In attempting to better understand the role of social desirability, the study tested for possible effects of moderation between CM scores and the ECR-S subscores.

Insert Tables 21D & 22D

Compared with the previous model, it appears that this model accounts for even less variance in hospital length of stay ($R^2 = .050$, $F(4, 112) = 1.46$, $p = .218$).

Furthermore, there does not appear to be a significant moderator effect of social desirability on anxiety ($b = -1.784$, $t = -1.784$, $p = .077$), nor with social desirability on avoidance ($b = 1.538$, $t = 1.538$, $p = .127$).

The study further examined the role of social desirability by examining the relationship between CM scores and ECR-S scores. A bi-variate correlation was run among the three variables.

Insert Table 23D

The data indicate that there was a significant correlation between social desirability scores and anxiety scores ($r = -.318$, $p < .001$), as well as between anxiety and avoidance scores ($r = .222$, $p = .013$).

One additional analysis conducted was to compare securely attached group to the collective, insecurely attached subjects (using median splits).

Insert Table 24D

From the table, it can be observed that no significant difference was observed between the secure group ($M = 14.65$, SD $= 18.94$) and the insecure group ($M = 13.68$, SD $= 17.74$, $p = .697$) for hospital length of stay.

Hypothesis III.b: Individuals with a preoccupied attachment style will obtain higher scores on a depression scale than either dismissive or securely attached patients.

Median split analysis was again utilized to test this hypothesis.

Insert Tables 25D & 26D

Here, the study finds that there were no significant differences in depression scores between the dismissive group's mean score of 6.16 (SD = 4.52) and the preoccupied group's mean score of 6.63 (SD = 6.37, p = .185). Comparing the preoccupied group to the secure group, however, a statistically significant difference (M = 4.66, SD = 3.93, p = .042) is evident, as the securely attached individuals appear to report lower levels of depression.

Hypothesis III.c: Individuals with secure attachment styles will report lower pain scores than insecurely attached patients.

Using median split analysis of ECR-S data, the study tested the attachment style subgroups against self-reported pain scores.

Insert Table 27D

From Table 27D it appears that securely attached patients demonstrated a mean pain score of 1.19 (SD = 2.42), whereas the insecurely attached patients displayed a mean

pain score of 1.15 (*SD* = 2.36, *p* = .751), indicating that there was not a statistically significant difference between the two groups.

To further examine possible between-group significance, a comparison of all four sub-groups was conducted via a one-way ANOVA.

Insert Table 28D

From the table, it is evident that there was not a significant effect of attachment style on reported pain score at the p < .05 level for the four attachment styles ($F(3, 113) = .645$, *p* = .587).

Overall, these additional analyses helped to further the investigator's understanding of attachment styles, particularly in regards to social desirability. Social desirability was found to be negatively correlated with subject anxiety (r = -.318, p < .001) and positively correlated with avoidance (r = .222, p = .013). Further understanding the role that social desirability may play in how subjects of differing attachment styles may interact with healthcare providers may be an area ripe for future research. It may be the case, for example, that some avoidant individuals are more likely to appear well for their providers and minimize their presenting symptoms. This could in turn lead to increased future healthcare cost for potentially untreated chronic illnesses.

ADDITIONAL TABLES

Table 1D
Secure v. Insecure Demographics (via ECR-S Median Splits)

Variable	Secure	Insecure	p-values
N	43	74	
Age	30.76 (5.11)	28.77 (7.25)	.004*
Years of Education	15.12 (2.68)	14.08 (2.53)	.557
Weeks Pregnant	27.74 (7.26)	27.74 (6.74)	.430

Table 2D
ECR-S Median Splits v. Edinburgh Depression Scores

Attach. Style	N	Mean	Std. Dev.	Sig.
Insecure	74	7.86	5.58	.006*
Dismissive	23	5.57	3.92	
Preoccupied	16	6.63	6.37	
Fearful	35	9.94	5.51	
Secure	43	4.67	3.97	
Total Sample	117	6.69	5.26	

Table 3D
One-way ANOVA: Attachment Styles & EPDS using Median Splits

	df	Mean Sq.	F	Sig.
Btw. Groups	3	191.40	8.190	< .001*
Within Groups	113	23.37		

Table 4D
Post hoc Analysis: ECR-S Median Split Categories & EPDS

Att. #1	Att. #2	Mean Diff.	Std. Error	Sig.
Secure	Dismissive	-.891	1.25	.892
	Preoccupied	-1.95	1.42	.516
	Fearful	-5.27	1.10	< .001*
Dismissive	Preoccupied	-1.06	1.57	.907
	Fearful	-4.38	1.30	.006*
Preoccupied	Fearful	-3.32	1.46	.110

Table 5D
Homogeneity of Variance for EPDS

	F	df1	df2	Sig.
EPDS	3.79	3	113	.012

Table 6D
Welch's test for EPDS

	F	df1	df2	Sig.
EPDS	7.48	3	46.20	< .001*

Table 7D
ECR-S Median Splits v. PSS Scores

Attach. Style	N	Mean	Std. Dev.	Sig.
Insecure	74	17.18	8.18	< .001
Dismissive	23	13.52	6.76	
Preoccupied	16	13.13	7.92	
Fearful	35	21.43	7.15	

ECR-S Cont.

Secure	43	10.74	5.55
Total Sample	117	14.81	7.93

Table 8D
One-way ANOVA: Attachment Styles & PSS using Median Splits

Effect	df	Mean Sq.	F	Sig.
Btw. Groups	3	845.28	19.36	< .001*
Within Group	104	43.66		

Table 9D
Post hoc Analysis: ECR-S Median Split Categories & PSS

Att. #1	Att. #2	Mean Diff.	Std. Error	Sig.
Secure	Dismissive	-2.78	1.71	.371
	Preoccupied	-2.38	1.94	.612
	Fearful	-10.684	1.51	< .001*
Dismissive	Preoccupied	.397	2.16	.998
	Fearful	-7.91	1.78	< .001*
Preoccupied	Fearful	-8.30	2.00	< .001*

Table 10D
ANCOVA: ECR-S Median Split Categories with Stress as Moderator for Depression

Variable	df	Mean Sq.	F	Sig.
PSS	1	1547.88	158.63	< .001*
Att. Category	3	7.39	.757	.520

Table 11D
One-way ANOVA: Attachment Style & Healthcare Utilization via ECR-S Median Splits

Variable	Mean Squares	F	p-value
Physician visits in past 12 months	117.44 174.27	.674	.570
Other healthcare visits in past 12 mo.	10.31 20.25	.509	.677
Hospital visits in past 12 months	48.28 26.00	1.86	.141
ER visits in past 12 months	12.87 5.22	2.47	.067
Pain Score	3.66 5.67	.645	.587
Days at BUMC	248.72 332.51	.748	.526
Pain meds/day	2.54 2.04	1.24	.298
Sleep meds/day	2.54 2.04	2.74	.047*
Anxiety meds/day	.003 .008	.345	.793
Depression meds/day	.027 .017	1.60	.193

Table 12D
ECR-S Median Splits for Attachment Style v. Sleep Medications/Day

Attach. Style	N	Mean	Std. Dev.	Std. Error
Secure	43	.055	.026	.004
Dismissive	23	.019	.070	.015
Preoccupied	16	.194	.348	.087
Fearful	35	.208	.468	.079

Table 13D
Post hoc Analysis: ECR-S Median Split Categories & Sleep Medications/Day

Att. #1	Att. #2	Mean Diff.	Std. Error	Sig.
Secure	Dismissive	.036	.079	.968
	Preoccupied	-.139	.089	.412
	Fearful	-.152	.070	.131
Dismissive	Preoccupied	-.175	.099	.300
	Fearful	-.189	.082	.104
Preoccupied	Fearful	-.014	.092	.999

Table 14D
PSS Scores with Median Splits via MANOVA

Effect	Value	F	Hyp df	Error df	Sig.	η^2
PSS Λ	.893	1.42	9	107	.189	.107

Table 15D
Dismissive v. Preoccupied Attachment Styles & LOS Using Median Splits

Attach. Style	N	Mean	Std. Dev.	Sig.
Dismissive	23	17.30	21.71	.822
Preoccupied	16	15.81	17.23	

Table 16D
Secure v. Preoccupied Attachment Styles & LOS Using Median Splits

Attach. Style	N	Mean	Std. Dev.	Sig.
Secure	43	14.65	18.94	.778
Preoccupied	16	15.81	17.23	

Table 17D
One-way ANOVA: Attachment Styles & LOS using Median Splits

Effect	df	Mean Sq.	F	Sig.
Btw. Groups	3	248.72	.748	.526
Within Groups	113	332.51		

Table 18D
One-way ANOVA: Attachment Styles & LOS – CM Exclusion

Effect	df	Mean Sq.	F	Sig.
Btw. Groups	3	51.48	.209	.890
Within Groups	33	246.22		

Table 19D
Model Summary for ECR-S and CM as Predictors of LOS

Model	R	R²	Adj. R²
1D	.138	.019	-.007

Table 20D
Subscores of ECR-S and CM as a Predictor of LOS

Variable	Beta	t	Sig.
Anxiety	-.079	-.787	.433
Avoidance	.103	1.074	.285
CM	.055	.561	.576

Table 21D
Model Summary for ECR-S as a Predictor of LOS with CM Moderators

Model	R	R²	Adj. R²
2D	.223	.050	.016

Table 22D
Subscores of ECR-S as a Predictor of LOS with CM Moderators

Variable	Beta	t	Sig.
Anxiety	-.084	-.882	.380
Avoidance	.110	1.165	.247
Mod_cm_anx	-1.784	-1.784	.077
Mod_cm_avoid	1.538	1.538	.127

Table 23D
Bivariate Correlations of CM Scores & ECR-S Subscores

Variable	Anxiety	Avoidance	CM Score
Anxiety	1.00	.222 (p = .013*)	-.318 (p < .001*)
Avoidance	--	1.00	-.001 (p = .987)
CM Score	--	--	1.00

Table 24D
Secure v. Insecure Attachment Styles & LOS Using Median Splits

Attach. Style	N	Mean	Std. Dev.	Sig.
Secure	43	14.65	18.94	.697
Insecure	74	13.68	17.74	
Dismissive	23	17.30	21.71	
Preoccupied	16	15.81	17.23	
Fearful	35	10.51	15.04	
Total	117	14.03	18.11	

Table 25D
Dismissive v. Preoccupied Attachment Styles & EPDS Using Median Splits

Attach. Style	N	Mean	Std. Dev.	Sig.
Dismissive	25	6.16	4.52	.185
Preoccupied	16	6.63	6.37	

Table 26D
Secure v. Preoccupied Attachment Styles & EPDS Using Median Splits

Attach. Style	N	Mean	Std. Dev.	Sig.
Secure	44	4.66	3.93	.042
Preoccupied	16	6.63	6.37	

Table 27D
ECR-S Median Split Attachment Styles v. Pain Scores

Attach. Style	N	Mean	Std. Dev.	Sig.
Insecure	74	1.15	2.36	.751
Dismissive	15	1.07	2.19	
Preoccupied	18	.67	1.91	
Fearful	43	1.44	2.39	
Secure	43	1.19	2.42	
Total	117	1.16	2.37	

Table 28D
One-way ANOVA: Attachment Styles & Pain Scores Using ECR-S Median Splits

Effect	df	Mean Sq.	F	Sig.
Btw. Groups	3	3.66	.645	.587
Within Group	113	5.67		

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