POSTPARTUM DEPRESSION:

DO INTRAPARTUM EVENTS MATTER?

by

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SIGNED: Heather Lin Evans

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DEDICATION

This is dedicated to my son, William Evans.
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ABSTRACT

Approximately 500,000 women in the US suffer from postpartum depression (PPD) every year. Yet only half of women affected seek treatment. PPD affects the entire family unit, altering parenting behaviors and increasing prevalence of depression among male partners of women suffering from PPD. In addition, infants whose mothers suffer from PPD have a higher risk of Sudden Infant Death Syndrome (SIDS) and more frequent hospitalization as well as cognitive and behavioral delays. Despite the significance of PPD to the health of women and families, most research has focused on the identification and treatment of PPD. Research pertaining to intrapartum events as possible risk factors for PPD has been contradictory and variable in quality. The purpose of this study is to examine possible relationships between intrapartum events and subsequent incidence of postpartum depression.

The Diathesis-Stress Model provides the foundation for this proposed research, in which a combination of vulnerability factors (diatheses) in the context of life events (stress) results in psychopathology (PPD). Vulnerability factors such as previous history of depression, prenatal anxiety, or low self esteem may interact with intrapartum stressors such as cesarean section, induction of labor, or use of pain medication to increase PPD symptomatology. This study will examine the stress component of the Diathesis-Stress Model. Should intrapartum events prove to have a relationship with Edinburgh Postnatal Depression Scale (EPDS) score, future research will focus on the interaction of both the diatheses and the stressors in determining risk for PPD.

The study design was a retrospective descriptive design aimed at identifying relationships between intrapartum events and PPD. A chart review was performed to identify
intrapartum events and scores on the Edinburgh Postnatal Depression Scale (EPDS) at two- and six-weeks postpartum. The sample consisted of 102 women who delivered at a specified rural New England birthing center during 2007. SPSS was used to examine relationships between specific intrapartum events and EPDS scores at two- and six weeks postpartum.

Nurses commonly interface with women in health care settings and are uniquely poised to educate them about PPD. Nurses have the unique opportunity to alert women to the potential risk for PPD and encourage them to report signs and symptoms early. Increased reporting of symptoms can reduce the number of unidentified cases and promote interventions that avert some of the devastating emotional, physical, and economic consequences.
CHAPTER 1: BACKGROUND AND SIGNIFICANCE

Introduction

This chapter presents the problem and details background pertaining to postpartum depression (PPD), defined as depressed mood that occurs in the period after childbirth (Epperson, 1999). This is followed by background related to a potential relationship between intrapartum events, defined as stressors that occur during labor and delivery, and postpartum depression (PPD). The purpose and specific aims of the present study are detailed and specific related terminology is defined.

Background

Each year, more than 400,000 mothers in the United States experience PPD (Beck & Gable, 2000). Reported prevalence of PPD symptoms varies widely. Rates of PPD during the first six months postpartum are reported to be 10-22% in all women and up to 26% among adolescent mothers (Cox, Murray & Chapman, 1993; Llewellyn, Stowe & Nemeroff, 1997). A 2006 literature review highlighted the discrepancy in reported prevalence of PPD, indicating that reported prevalence ranges from 0% to 60% in various culturally specific samples (Halbreich & Karkun, 2006). This shows that previous estimates of PPD prevalence may not be representative of global prevalence. With some samples identifying significantly higher PPD rates than other samples, methodological issues come into question (Leahy-Warren & McCarthy, 2007). Further complicating the issue, it is estimated that up to 50% of all cases go undetected (Beck & Gable, 2001).

Intrapartum events are any occurrence that takes place while a woman is laboring and delivering a baby. The most obvious intrapartum events are cesarean section,
induction of labor, and the administration of pain medication. These interventions have become the topic of conversation for both healthcare providers and childbearing women. As women have moved into the workforce and are leading busy lives, induction of labor has become attractive, as it allows the woman and her family to plan for the birth. The use of pain medication in labor continues to polarize health care providers and childbearing women with some people in favor and others drastically opposed. Cesarean section is a common intrapartum intervention, with an all time high in 2002 of more than a quarter (26.1%) of all births in the United States occurring via cesarean section (London, Ladewig, Ball & Bindler, 2007). Some areas of the United States have cesarean section rates that approach 40%. World wide, cesarean section rates are as low as 5% or 7% in Bolivia and Peru respectively and as high as 40% in Brazil and Chile (London, et al., 2007). Aside from pain medication, labor induction, and cesarean section, however, there are many other important aspects of the intrapartum time period that can be explored such as placement of an intravenous catheter, labor augmentation, use of vacuum extractor/forceps for delivery assistance, and length of time spent in each stage of labor.

The majority of the current literature pertaining to PPD and intrapartum events was conducted using samples of women living in the European Union (EU). Much of the recent literature describing North American women was conducted by Beck (1993, 1996, 2001, 2002, 2003), and comes from a sample of white, mid-upper socioeconomic status women residing in urban settings. These samples may not be representative of other
women residing in the United States. This researcher has not identified any PPD literature conducted using a sample of women living in rural, North American settings.

PPD may result in altered family functioning. Women who experience PPD symptoms may have difficulty transitioning into the mother role, as women with major PPD have described more profound emotional responses to their maternal role transitions (Clemmens, Driscoll & Beck, 2004). Altered maternal/child interactions have been identified in women who suffer from PPD (Sagami, Kayama & Senoo, 2004; Edhborg, Lundh, Seimyr & Widstrom, 2003; and Wisner, Chambers & Sit, 2006). Prenatal and postpartum depressive symptoms have also been associated with problem behaviors in male children of depressed mothers (Carter, Frampton & Mulder, 2006) and risk for later psychopathology in the children of mothers with PPD (Forman, O’Hara, Stuart, Gorman, Larsen & Coy, 2007). In addition, the incidence of paternal depression in community samples ranges from 1.2%-25.5% but paternal depression ranges from 24%-50% in samples of men whose partners were experiencing PPD (Goodman, 2004).

Definitions

Postpartum Depression (PPD)

PPD is a clinical term that refers to a depressive episode that is associated with childbirth (Epperson, 1999). PPD is a treatable mood disorder (Beck & Gable, 2001) that may begin at 24 hours after birth or several months postpartum but typically has an onset between two and six weeks postpartum (Epperson, 1999). PPD is not recognized as being distinct from nonpuerperal depression by the Diagnostic and Statistical Manual of Mental
Disorders (DSM-IV) but there is the possible addition of a postpartum-onset specifier for clients whose onset of depression was within four weeks of delivery (Epperson, 1999).

**Intrapartum**

The intrapartum time period begins with the onset of labor and ends with the delivery of the infant and placenta (London, et al., 2007). This time period is sometimes referred to in health care as labor and delivery.

**Postpartum**

The postpartum time period begins with the delivery of the placenta and continues until the woman’s body returns to a non-pregnant condition (London, et al., 2007). This may last anywhere from 9 months to 18 months.

**Postnatal**

Postnatal is synonymous with the term postpartum. The word ‘postnatal’ is more frequently used in European literature whereas the term ‘postpartum’ is more frequently used in North American literature.

**Critical Access Hospital**

A Critical Access Hospital (CAH) is a facility that meets specific criteria defined by the Center for Medicaid Services. The Critical Access Facility must:

1) be located in a State that has established with CMS a Medicare rural hospital flexibility program; *and*

2) be designated by the State as a CAH; *and*

3) be currently participating in Medicare as a rural public, non-profit or for-profit hospital; or was a participating hospital that ceased operation during the 10-year
period from November 29, 1989 to November 29, 1999; or is a health clinic or health center that was downsized from a hospital; and

4) be located in a rural area or is treated as rural; and

5) be located more than a 35-mile drive from any other hospital or CAH (in mountainous terrain or in areas with only secondary roads available, the mileage criterion is 15 miles); and

6) maintain no more than 25 inpatient beds; and

7) maintain an annual average length of stay of 96 hours per patient for acute inpatient care; and

8) comply with all CAH Conditions of Participation, including the requirement to make available 24-hour emergency care services seven days per week.

(Department of Health & Human Services, 2008).

Rural

The U.S. Census Bureau (2007) defines rural as a territory, population or housing unit which is not classified as urban. To be classified as urban, the territory, population or housing units generally consists of a large central place and adjacent densely settled census blocks that together have a total population of at least 2,500 for urban clusters, or at least 50,000 for urbanized areas (U.S. Census Bureau, 2007).

Study Variables

Independent and dependent variables are defined and discussed in Chapter 2.
Problem and Purpose

Current research has focused on the identification and treatment of PPD and the identification of pre-disposing risk factors. A thorough examination of intrapartum events as possible risk factors has not been performed, with current literature contradictory and variable in quality. The purpose of this study was to examine relationships between intrapartum events and postpartum depression.

Specific Aims

The three specific aims identified were:

1) To describe the number of intrapartum events experienced by women who gave birth in a birthing center located in rural New England during the 2007 calendar year.

2) To describe PPD scores on the Edinburgh Postpartum Depression Scale at two- and six- weeks postpartum for this sample.

3) To explore the relationship between number of intrapartum events and Edinburgh Postnatal Depression Scale scores in women in this sample at two- and six-weeks postpartum.

Research Questions

Two research questions were identified:

1) Does the number of intrapartum events have a relationship with the Edinburgh Postnatal Depression Scale score at both two- and six-weeks postpartum?
2) Do some intrapartum events have more significant relationships to Edinburgh Postnatal Depression Scale scores than other intrapartum events?

Significance

Current knowledge indicates more than 400,000 women in the United States suffer from PPD annually (Beck & Gable, 2000). Reported prevalence of PPD symptoms varies widely. Rates of PPD during the first six months postpartum are reported to be 10-22% in all women and up to 26% among adolescent mothers (Cox, Murray & Chapman, 1993; Llewellyn, Stowe & Nemeroff, 1997). Halbreich & Karkun (2006) report the prevalence of PPD as high as 60% in some culturally specific samples, but note many discrepancies in prevalence rates reported. Prevalence of PPD symptoms was more than 23% in a sample of Native American women (Baker, Cross, Greaver, Wei, Lewis & Healthy Start CORPS, 2005), 25.6% of Turkish women participating in a study screened at a high PPD level (Dindar & Erdogan, 2007), and 22% of mothers from a sample of Iranian women screened positive for PPD symptomatology (Montazeri, Torkan & Omidvari, 2007). This demonstrates previous estimates of PPD prevalence may not be representative of global prevalence. With some samples identifying significantly higher PPD rates than other samples, methodological issues come into question (Leahy-Warren & McCarthy, 2007). Further complicating the issue, it is estimated that up to 50% of all cases go undetected (Beck & Gable, 2001). Although prevalence of PPD appears high, few have investigated the contributions of intrapartum events to PPD.
Clinically, I have observed an increase in the number of interventions that are becoming common practice during the intrapartum period. I have also witnessed the difficult transition to motherhood and the devastating effects of PPD experienced by some women. These two anecdotal observations made me curious about the relationship between intrapartum events and PPD.

Rurality was not the focus of the present study, but it provided context and setting for the sample selected. This study afforded an opportunity to focus on women who delivered in a rural setting and report findings from a homogenous group of women living in a rural community. Rural dwelling women have rarely been described in PPD literature.

Nurses caring for childbearing women are uniquely poised to educate women about PPD. Should intrapartum events significantly relate to outcome of PPD, nurses can alert women to the potential risk and encourage early reporting of signs/symptoms. Increased reporting can reduce the number of unidentified cases and promote interventions that avert devastating emotional, physical, and economic consequences.

Summary

Identification of relationships between intrapartum events and PPD is an important area in need of nursing research, particularly because PPD affects so many women and families. With the identification of relationships between intrapartum events and PPD, nurses, as front line care providers for women, are uniquely poised to educate and provide early detection.
CHAPTER 2: CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

Introduction

This chapter describes the Diathesis-Stress Model, the conceptual framework upon which the study was based. The concepts of diathesis and stress, as described by the Diathesis-Stress Model, are reviewed followed by definitions of study variables related to intrapartum stress. Finally, review and critique of pertinent extant literature is presented.

Diathesis-Stress Model

To understand the Diathesis-Stress Model, the underlying concepts must be delineated. The word *diathesis* derives from the Greek idea of *disposition*, related to the humoral theory of temperament and disease (Zuckerman, 2000). This humoral theory of temperament held that black bile was the diathesis for depression, or melancholia (Zuckerman, 2000). Diathesis is currently conceptualized as a predispositional factor, or set of factors, making possible a disordered state (Ingram & Luxton, 2005). Diatheses are the antecedent condition for the development of a disorder, and may be biological or psychological (Zuckerman, 2000).

Most discussions regard diatheses as enduring traits, relatively permanent and determined by genetic endowment (Ingram & Luxton, 2005). For instance, when referring to people with schizophrenia, Zubin and Spring (1977) noted that “the one feature that all schizophrenics have…is the everpresence of their vulnerability” (p. 122). However, Hankin & Abela (2005) indicate that, while diathesis is permanent in many cases, it is not always true. For instance, if the level of vulnerability analysis is psychological rather than genetic, change may be possible (Hankin & Abela).
The term diathesis is synonymous with the term vulnerability, the two being used interchangeably in psychopathology literature. Thus, some also refer to the Diathesis-Stress Model as a Vulnerability-Stress Model. For the sake of clarity, I will only refer to the term diathesis when naming the model throughout this paper.

The second important concept is stress. The term stress is borrowed from physics, where it refers to “a force exerted when one body or body part presses on, pulls on, pushes against, or tends to compress or twist another body or body part” (Merriam-Webster, 2007). In psychiatry, stress is defined as the physical and psychological factors that impose strain on a person or the effects of the strain on him (Zuckerman, 2000). Stress can be viewed as major or minor life events that disrupt mechanisms which maintain the stability of an individual’s physiology, emotion, and cognition (Ingram & Luxton, 2005). Zuckerman (2000) explained severe stress events may leave a residue of depression following them.

Given an understanding of the terms diathesis and stress, the Diathesis-Stress Model can then be defined as a combination of stress factors (diatheses) in the context of life events (stress) which result in psychopathology (Zvolensky, Kotov, Antipova & Schmidt, 2005). So, without the occurrence of negative events (the stress), individuals who possess depressogenic schemata (the diatheses) are no more likely to become depressed than are individuals who do not possess such schemata (Abela & D’Alessandro, 2002). This theory originated from Meehl’s (1962) schizophrenia theory in which he described a dominant “schizogene” as the diathesis that eventuates in a schizotypic personality after the introduction of an environmental stressor. Thus, Meehl
(1962) proposed a relationship between diathesis (genetic or personality traits) and the occurrence of stressors in the expression of schizophrenia. Meehl clarified his model in 1989 and 1990. The Diathesis-Stress Model, previously applied to schizophrenia, was further applied to depression by Beck (1967, 1983). The Diathesis-Stress Model has continued to serve as the foundation for depression research involving breast cancer (Badger, Segrin, Meek, Lopez & Bonham, 2005), adolescent depression (Lewinsohn, Joiner & Rhode, 2001), and postpartum depression (Grazioli & Terry, 2000).

Hypothetical Diathesis-Stress Model for Exploration of Postpartum Depression

The Diathesis-Stress Model has been used to generate theories of schizophrenia (Meehl, 1962), depression (Beck, 1967; Monroe & Simons, 1991; Robins & Block, 1988), major depressive disorder in adolescents (Lewinsohn, Joiner & Rhode, 2001), and psychological distress in women with breast cancer (Badger, Segrin, Meek, Lopez & Bonham, 2005). The Diathesis-Stress Model has also been used to generate theories explaining anxiety disorders (Williams, Reardon, Murray & Cole, 2005), eating disorders (Cooper, 2005), and substance abuse in adolescence (Kassel, Weinstein, Skitch, Veilleux & Mermelstein, 2005). Because the Diathesis-Stress Model has not previously been used to fully explore postpartum depression (PPD), a hypothesized model was developed.

Prenatal risk factors for PPD have been extensively explored. Personal or family history of depression, high levels of psychosocial stress, marital discord, and inadequate social support are considered risk factors for PPD (Clay & Seehusen, 2004). Beck (1996) identified prenatal depression, childcare stress, prenatal anxiety, life stress, social support, marital relationship, history of depression, infant temperament, and maternity
blues as PPD risk factors. Self-esteem, marital status, socioeconomic class, and unplanned/unwanted pregnancy were added as PPD risk factors in 2001 (Beck & Gable, 2001). In total, 13 risk factors have been identified as significant risk factors for PPD; prenatal depression, child care stress, life stress, social support, prenatal anxiety, marital satisfaction, depression history, infant temperament, maternity blues, self-esteem, socioeconomic status, marital status, and unplanned or unwanted pregnancy (Beck, 2002). In the hypothesized model, these 13 risk factors are seen as the diathesis for PPD.

Honey and Morgan (2003) directly addressed the Diathesis-Stress Model in relation to PPD, explaining that high Edinburgh Postnatal Depression Scale scores were predicted by women’s predisposition to depression, negative appraisals of an anticipated childcare stressor, perceptions of low antenatal support, and a high use of avoidance coping. However, very little attention has been placed on exploring the stress component of the Diathesis-Stress Model as it pertains to PPD. This is similar to the comments made by Zvolenski, et al., (2005) in their assessment of the neglect in exploring the stressor component in predicting anxiety symptoms. In the hypothesized model, intrapartum events are explored as the stress component for PPD.

While birth itself can be seen as a stressor, it is also a normal, natural event. To date, there is a lack of research that explores intrapartum events as possible stressors, each having potential to be more of a stressor than others with possible additive effects. Thus, intrapartum events, rather than birth itself, are hypothesized to be stressors in the Diathesis-Stress Model of PPD.
Meehl’s original Diathesis-Stress Model (Figure 1) describes how a person with a genetic predisposition to psychopathology must encounter an environmental stressor in order to produce the psychopathology (Hankin & Abela, 2005). Monroe and Simons (1991) developed a variation of the Diathesis-Stress Model in order to describe depression (Figure 2). In the Monroe and Simons (1991) model, stress is either a minor factor, a result of the diathesis’s expression, or simply a consequence of the emerging disorder.

The hypothesized Diathesis-Stress Model for PPD (Figure 3) indicates that the 13 stressors identified by Beck and Gable (2001) are the diatheses. They present themselves
as the predisposing risk factors for developing PPD. Because giving birth is a stressor of its own accord, a person may experience the PPD simply because they gave birth and they possess one or more of the predisposing risk factors. However, this model proposes that additional intrapartum stressors, in combination with the presence of one or more diatheses, will result in PPD. Unlike the Munroe and Simons (1991) model, the stressor can not be the consequence of the emerging disorder, as intrapartum events precede PPD in all situations.

FIGURE 3: Diathesis-Stress Model for Postpartum Depression

Since prenatal risk factors have been studied extensively, the present study focused on the stress component (intrapartum events) of the Diathesis-Stress Model of
PPD. An examination of correlation between the number of stressors and Edinburgh Postnatal Depression Scale scores was performed. A model was then constructed to determine which of the intrapartum events explain variance. The number of intrapartum stressors was predicted to have a positive relationship with Edinburgh Postnatal Depression Scale scores and both two- and six-weeks postpartum. In addition, it was predicted that some intrapartum stressors would have more significant relationships to Edinburgh Postnatal Depression Scale scores than other intrapartum stressors.

Research Variables

**Intrapartum Events**

Independent variables of interest are planned or unplanned cesarean section, intravenous catheter usage, labor induction or augmentation, pain medication use, prolonged first or second stage of labor, episiotomy, and perineal laceration. Each independent variable will be discussed in this section.

*Cesarean section.* Cesarean section (c-section) is the surgical procedure that results in the birth of an infant through an abdominal and uterine incision (London, et al., 2007). C-sections were originally used in an attempt to save the fetus of a dying woman but today c-sections are frequently performed for stable women whose fetuses are unstable (London, et al., 2007). In 2002, c-section rates in the United States reached an all-time high of 26.1% of all births (Hamilton, Martin & Sutton, 2003). When compared to vaginal births, elective c-sections have a higher maternal morbidity rate with only 2.1 per 100,000 women dying during vaginal birth and 5.9 per 100,000 women dying during c-section (Hannah, 2004). Women who undergo emergency or unplanned c-sections face
a mortality rate of 18.2 per 100,000 (Hannah, 2004). Maternal morbidity following c-section is usually associated with infection, reaction to medications, blood clots, or hemorrhage (London, et al., 2007).

A planned c-section is any birth by c-section that was planned, in cooperation of the woman and her health care provider, prior to the woman going into labor. An unplanned or emergency c-section is any birth by c-section that was not planned by the woman and her health care provider prior to her going into labor. The unplanned or emergency c-section may be the result of either fetal or maternal health issues. Both planned and emergent c-sections will be measured as dichotomous variables.

**Labor induction.** Induction of labor is broken down into two distinct interventions; cervical ripening and induction of uterine contractions. These two interventions, while related, are compared separately.

Cervical ripening is the softening and effacing of the cervix (London, et al., 2007). Cervical softening occurs as the result of endogenous prostaglandins. Following cervical softening, the cervix effaces. Cervical effacement is the shortening of the cervix in preparation for cervical dilation. Pharmacologic methods of cervical ripening include prostaglandin agents, such as Cervidil, as well as misoprostol, a synthetic PGE\(_1\) analogue (London, et al., 2007). The use of prostaglandin agents or synthetic PGE\(_1\) analogues prior to the onset of labor are considered induction of labor by method of cervical ripening. Cervical ripening will be measured as a dichotomous variable.

Induction of uterine contractions may be accomplished with amniotomy, stripping of the amniotic membranes, or intravenous infusion of Pitocin (London, et al., 2007).
This study focuses on the use of Pitocin, an exogenous form of oxytocin, as the method for labor induction. Exogenous oxytocin (Pitocin) exerts a selective stimulatory effect on the smooth muscle of the uterus by increasing the excitability of the myometrial cells of the uterus (London, et al., 2007). The use of Pitocin prior to the onset of labor is considered induction of labor by method of stimulation of uterine contractions. This will be measured as a dichotomous variable.

*Labor augmentation.* Pitocin, discussed above as a method to induce labor contractions, may also be used to augment labor that is progressing slowly or that has stalled. Any use of Pitocin, after the onset of labor, is considered augmentation of labor. Labor augmentation with the use of Pitocin will be measured as a dichotomous variable.

*Pain medication.* Labor and birth are personal and highly subjective events. As such, childbearing women may experience varying level of pain or discomfort during the intrapartum time period (London, et al., 2007). For some women, the pain and discomfort experienced in the intrapartum time period make coping difficult. For this reason, many women choose to use pharmacologic interventions throughout the intrapartum period. Pharmacologic interventions include systemic medications, regional medications, local medications, and general anesthesia. For this research, any use of pain medication during the intrapartum period, regardless of route of administration or therapeutic effect, was recorded as a dichotomous variable by specific type.

Systemic drugs, a form of analgesia, have the goal of providing maximum pain relief at minimum risk for the woman and fetus (London, et al., 2007). These medications
are administered via intramuscular or intravenous injection and may be narcotic analgesics, such as Stadol or Nubain, or an opioid such as Morphine.

Regional anesthesia is the temporary loss of sensation produced by injecting an anesthetic agent into direct contact with nervous tissue, usually in the epidural or intrathecal spaces of the spine (London, et al., 2007). The local agent stabilizes cell membranes, preventing the initiation or transmission of nerve impulses. Pharmacologic agents frequently used for regional anesthesia include amides, such as Xylocaine, Carbocaine, or Marcaine and opioids, such as morphine, fentanyl, butrophanol, and meperidine.

Local infiltration of anesthesia, in the intrapartum period, is the injection of an anesthetic agent into the intracutaneous, subcutaneous, or intramuscular areas of the perineum (London, et al., 2007). Local anesthesia is generally used in preparation for an episiotomy or for the repair of a laceration following birth. Pharmacologic agents frequently used as local anesthesia during the intrapartum period are Nesacaine, Xylocaine, and Carbocaine.

General anesthesia induces unconsciousness and may be used for cesarean birth or for other complications, such as retained placenta following birth (London, et al., 2007). A combination of intravenous injection of pharmacologic agents and inhalation of anesthetic agents is used for general anesthesia.

Prolonged first stage of labor. The first stage of labor is broken into three phases; the latent phase, the active phase, and the transition phase. The latent phase begins when contractions become regular, although they may still be of mild strength and short in
duration. The cervix begins to dilate and efface. Women in this phase are generally able to cope well with their contractions (London, et al., 2007).

The active phase is characterized by contractions that are of increased intensity, duration, and frequency. During this phase, the cervix usually dilates from 3 cm to 8 cm. Women in this phase often have increased pain, fear, and a loss of some coping mechanisms (London, et al., 2007).

Transition, the final phase of the first stage of labor, is characterized by strong contractions that occur every two minutes and last approximately 60 to 90 seconds. Cervical dilation progresses from 8 to 10 cm and the woman may have difficulty coping with the increased contraction pain and frequency of contractions (London, et al., 2007).

For a nullipara, a woman who has not previously given birth, the first stage of labor lasts an average of 16.8 hours (London, et al., 2007). Whereas the first stage of labor for a multipara, a woman who has given birth to at least one previous baby, is usually less than 10 hours. Prolonged first stage of labor was measured as both a dichotomous variable, whether or not the woman experienced greater than 24 hours in the first stage of labor, and as a ratio measurement of actual time spent in the first stage of labor.

**Prolonged second stage of labor.** The second stage of labor begins with complete cervical dilation and ends with the delivery of an infant (London, et al., 2007). During this stage the woman is required to push and deliver her infant. For a nullipara, the second stage of labor can last up to three hours whereas it usually only lasts up to 30 minutes for a multipara (London, et al., 2007). Prolonged second stage of labor was
measured as both a dichotomous variable, whether or not the woman experienced greater than two hours in the second stage of labor, and as a ratio measurement of actual time spent in the second stage of labor.

*Episiotomy*. An episiotomy is a surgical incision to the perineal body (London et al., 2007). This incision is cut in order to enlarge the perineal outlet, allowing for a more rapid delivery of the fetal head or for the placement of instruments such as forceps or a vacuum extractor. Episiotomy is the second most common procedure in maternal-child care but the routine use of episiotomies has been questioned for several years (London, et al., 2007). This is because the perineal lacerations characteristic of normal vaginal birth heal more quickly than the extension of deep perineal tears that sometimes result from episiotomies (London, et al., 2007). Episiotomy was measured as a dichotomous variable of women either having an episiotomy or not having an episiotomy.

*Degree of perineal laceration*. The perineum may become lacerated as a result of the normal birth process or as the result of episiotomy. Perineal lacerations are graded on a scale of 1 to 4. A first degree laceration involves a vaginal laceration and perineal skin. A second degree laceration extends into the perineal muscle. A third degree laceration extends into the anal sphincter and a forth degree laceration extends completely through the anal sphincter (London, et al., 2007). Perineal laceration was measured as an ordinal variable.

*Postpartum Depression*

The dependent variable of interest is PPD. PPD is a clinical term that refers to a depressive episode that is associated with childbirth (Epperson, 1999). PPD is a treatable
mood disorder (Beck & Gable, 2001) that may begin at 24 hours after birth or several months postpartum but typically has an onset between two and six weeks postpartum (Epperson, 1999). PPD is not recognized as being distinct from nonpuerperal depression by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) but there is the possible addition of a postpartum-onset specifier for clients whose onset of depression was within four weeks of delivery (Epperson, 1999).

The Edinburgh Postnatal Depression Scale (Appendix A) is the most widely used instrument for detecting PPD symptoms (Boyd, Le & Somberg, 2005). This study utilized the Edinburgh Postnatal Depression Scale score as a predictor for PPD. The cutoff score of 12/13 was used to identify risk for PPD. PPD was measured as a dichotomous variable of the summated Edinburgh Postnatal Depression Scale score.

Literature Review

An online search was performed using Medline, the Cumulative Index of Nursing and Allied Health Literature (CINAHL), and the Allied and Complementary Medicine index (AMED). The online search was performed using the terms “postpartum depression” or “postnatal depression.” The only limit placed on the search was to show only results printed in the English language. The search resulted in more than 2,500 references from 1950 to the present. Those results were then further limited by cross-referencing terms of interest such as cesarean section, pain medication, screening scale, and intrapartum.
Postpartum Depression Risk Factors

Research has identified PPD as a health problem for women and adequate screening instruments have been developed and tested. Focus has also been placed on identifying risk factors for PPD such as history of previous depression, life stress, lack of social support, prenatal anxiety, and marital dissatisfaction (Beck, 1996). Biological risk factors have also been explored such as low serum estradiol (Ahokas, Kaukoranta & Aito, 1999) and fluctuations in gonadal steroid levels (estradiol and progesterone) (Bloch, Schmidt, Danaceau, Murphy, Nieman & Rubinow, 2000). Nierop, Bratsikas, Sinnermann and Ehlert (2006) found evidence that “healthy pregnant women developing postpartum depressive symptoms might be identified during pregnancy by means of their higher cortisol reactivity and their higher psychological reactivity in response to psychosocial stress” (p. 931). While these biological risk factors are of interest, more rigorous research is needed to validate the findings. For instance, the research identifying low estradiol levels as a risk factor for PPD had a sample size of two participants (N = 2) (Ahokas, Kaukoranta & Aito, 1999). The Bloch, et al., (2000) study that identified fluctuating estradiol and progesterone levels as risk for PPD had 16 participants (N = 16) and the authors did not provide operational definitions of their important concepts.

Prenatal risk factors for PPD have been extensively explored. Personal or family history of depression, high levels of psychosocial stress, marital discord, and inadequate social support are considered risk factors for PPD (Clay & Seehusen, 2004). Beck (1996) identified prenatal depression, childcare stress, prenatal anxiety, life stress, social support, marital relationship, history of depression, infant temperament, and maternity
blues as PPD risk factors. Self-esteem, marital status, socioeconomic class, and unplanned/unwanted pregnancy were added as PPD risk factors in 2001 (Beck, 2001). Culture must also be considered when identifying risk factors, as giving birth to a girl has been identified as a risk for PPD in a Turkish Sample (Dindar & Erdogan, 2007) and polygamy is a risk factor for PPD in a sample of Nepalese women (Ho-Yen, Bondevik, Eberhard-Gran & Bjorvatn, 2007).

Intrapartum Events and Postpartum Depression

Literature discussing possible relationships between events of the birth process and the onset or severity of PPD is limited. The information that does exist is largely contradictory. Adewuta, Fatoye, Ola, Ijaodola and Ibigbami (2005) reported predictors of PPD in their sample included preterm delivery, instrumental delivery, and having a c-section. Edwards, Porter and Stein (1993) reported a significantly higher incidence of postnatal depression found among participants who had undergone c-section than those who had a vaginal delivery. General, but not regional anesthesia used for cesarean section was found to have a significant association with PPD (Edwards, et al., 1993). Furthermore, Koo, Lynch and Cooper (2003) found women who had an emergency delivery (cesarean section, forceps, or vacuum) had a risk of developing PPD at six weeks postpartum that was almost two times greater than that of women who did not have emergency deliveries. Verdoux, Glatigny-Dallay and Minissini (2002) reviewed literature and found an increased risk of PPD after delivery complications such as cesarean section, use of forceps, or long labor. The authors then tested this in a sample of 441 women and found that “exposure to severe obstetrical complications during
pregnancy was associated with more intense depressive symptoms in the early postnatal period” (Verdoux, et al., 2002, p. 212). Finally, Robertson, Grace, Wallington and Stewart (2004) performed an analysis of peer-reviewed literature and found that pregnancy-and delivery-related complications had a small but significant effect on the development of PPD.

There were many contradictions to the above findings. Carter, Frampton and Mulder (2006) indicated the link between cesarean section and postpartum depression has not been established. Forman, Videbech, Hedegaard, Salvig and Seecher (2000) had the largest sample for all current postpartum depression research, 6790 pregnant, Danish speaking women. Results indicated no association between pregnancy or delivery complications and PPD (Forman, et al., 2000). These findings were supported by the research of Josefsson, Angelsioo, Berg, Ekstrom, Gunnervik, Nordin & Sydsjo, in 2002. The setting for this study was Denmark, where health care differs from health care in the United States. Denmark, like many European countries, uses nationalized health care and the attitudes and decision making related to health care may differ from that of United States.

Patel, Murphy and Peters (2005) recently reported no evidence that elective c-section increased the odds of PPD when compared with planned vaginal delivery and there was also no evidence to suggest an increased risk of PPD with emergency c-section or assisted vaginal delivery when compared to spontaneous vaginal delivery. Finally, Hiltunen, Raudaskoski, Ebeling & Moilanen, (2004) reported that “elective or emergency
cesarean section did not increase the risk of high EPDS scores at the first week or at four months postpartum” (p. 257).

With this wide array of contradictory findings, one must question the rigor of the current research. Literature pertaining to postpartum depression is vast and extremely variable in quality (Robertson, et al., 2004). In addition, some of the variables identified and measured may not be truly independent (Robertson, et al., 2004). Rather, the variables might be influenced by extraneous variables. For example, decisions made that lead to interventions during the intrapartum period differ between physicians, hospitals, and countries (Robertson, et al., 2004).

Carter, Frampton and Mulder (2006) reported no support for a link between cesarean section and PPD. However, this finding was the result of a meta-analysis of current literature that examined only the impact of cesarean section on PPD (Carter, et al., 2006). The authors excluded studies that examined other delivery complications. The authors acknowledged that “few studies have adequately controlled for all confounding factors” (Carter, et al., 2006, p. 322) but they did not discuss how they addressed these confounding variables in their meta-analysis. For instance, Hiltunen, et al., (2004) reported receiving epidural anesthesia decreased the risk of PPD in their sample. This raises questions about the results reported by Carter, et al., (2006). What if cesarean section increases the risk of PPD but the women who received the cesarean section also received epidural anesthesia, acting to negate the risk?

Forman, Videbech, Hedegaard, Salvig and Seecher (2000) reported no association between delivery complications and PPD. However, the authors lacked discussion or
explanation of reasons for participant mortality. Of the 6790 women enrolled in the study, only 5091 women (75%) were included in the final analysis. The authors explained that 171 women were excluded due to missing items on their PPD screening questionnaire, 28 women were excluded due to infant death, and nine women were lost to follow-up. This explains 208 of the women who were lost. There was no explanation of the 1491 other women who were not included in the final analysis. Could the women who dropped out of the study have been experiencing more PPD than the women who completed the study? Social withdrawal is a known symptom of depression. Perhaps these women did not complete the study because they were depressed, and less likely to interact with others outside their home. The women who did not complete the study or were dropped due to missing data may be significantly different than the rest of the sample meaning that the results may not be representative of the sample or population of interest.

In contradiction to the above findings, Adewuya, et al., (2005) reported that cesarean section was a predictor of PPD, along with preterm delivery and instrumental delivery, in their sample of 876 Nigerian women. The authors then, however, noted that “women with medical complications and hospital admissions during pregnancy were more likely to have preterm babies through operative or instrumental deliveries, prolonging the baby’s, and hence the mother’s stay in the hospital” (Adewuya, et al., 2005, p. 356). The authors did not attempt to explore this further, though, making it difficult to know whether the relationship between cesarean section and PPD was due to
the surgery itself or, perhaps to a confounding variable such as the preterm delivery or the prolonged hospital stay.

   Edwards, Porter and Stein (1993) reported findings from their sample of English women and indicated there was a significant association between PPD and general anesthesia but no association between PPD and regional anesthesia. The authors also reported that there was no association between PPD and the indication for the cesarean section (Edwards, et al., 1993). This finding is surprising since healthcare providers working in the labor and delivery environment are aware the majority of cesarean sections performed under general anesthesia are due to emergency situations and the lack of time available to administer regional anesthesia. The authors provided no discussion as to why the women received general anesthesia so the possibility of confounding variables presents itself.

   Koo, Lynch and Cooper (2003) described findings indicating that women having emergency deliveries via cesarean section, forceps assistance, or vacuum assistance had twice the risk of developing PPD. However, the majority of the women in this sample were Malay, Chinese, or Indian. The authors did not validate their PPD screening instrument, the EPDS, for this sample of women. We cannot be sure that the cutoff score of 13, which the authors used to indicate risk of PPD, is appropriate for this sample nor can we be sure the instrument adequately measured PPD for this sample.
Conclusion

The Diathesis-Stress Model provided the theoretical framework for this research and was used to develop the hypothetical Diathesis-Stress Model for Postpartum Depression. Intrapartum events of interest, the independent variables, were described and defined with a clear indication of how they were measured. PPD, the dependent variable, was defined and the Edinburgh Postnatal Depression Scale was discussed as the instrument used to screen for PPD.

The extant literature focuses on diagnosing and treating PPD. Literature pertaining to PPD risk is focused on prenatal factors, family history, and personal history. Few studies examined intrapartum events and their relationship to PPD. Of those, the most common intrapartum event studied was cesarean section. The results of these studies were contradictory and variable in quality.
CHAPTER 3: METHODS

Introduction

This chapter discusses the methods chosen for this research. This chapter also includes rationale for the chosen research methods and concludes with a discussion of data collection procedures and instrumentation.

Design

A nonexperimental descriptive correlational design was employed to answer the following aims:

1) To describe the number of intrapartum events experienced by women who gave birth in a birthing center located in rural New England during the 2007 calendar year.

2) To describe PPD scores on the Edinburgh Postpartum Depression Scale at two- and six- weeks postpartum for this sample.

3) To explore the relationship between number of postpartum events and Edinburgh Postnatal Depression Scale scores in women in this sample at two- and six- weeks postpartum.

Two research questions were identified in order to clarify the aims. The first question was, “Does the number of intrapartum events have a relationship with the Edinburgh Postnatal Depression Scale score at both two- and six- weeks postpartum?” The second question was, “Do some intrapartum events have more significant relationships to Edinburgh Postnatal Depression Scale scores than other intrapartum events?”
Setting and Sample

Setting

As previously identified, women living in rural settings are underrepresented in research pertaining to PPD. This study was conducted at a critical access facility in a rural New England area. Participants received prenatal, intrapartum, and postpartum care from the healthcare providers of the OB/GYN clinical group associated with the critical access facility.

Sample

After obtaining University of Arizona Institutional Review Board (IRB) approval (Appendix B), a sample was selected from the delivery log of all women delivering in the birthing center of the identified rural access facility. All participants obtained prenatal, intrapartum, and postpartum care by a practice of Certified Nurse Midwives and Physicians at the identified facility, with delivery of their infants during the 2007 calendar year. All women who delivered at the identified facility were eligible to participate. Inclusion criteria were: delivery of a live fetus at the identified facility in 2007, 37-42 weeks gestation, and signed admission consent for their personal health data to be utilized for research purposes. Inclusion criteria was limited to women who had results of the Edinburgh Postnatal Depression Scale at two- and/or six- weeks postpartum. Women were excluded in the event of intrauterine fetal demise, infant death prior to the six-week postpartum PPD screening, or if the infant was not living in their home due to hospitalization or removal for safety reasons. These exclusion criteria could be confounders as infant morbidity and mortality are known to produce depression in
women. All women delivering in the identified facility signed consent for medical records to be used for facility-approved research (Appendix C).

Power analysis. Power analysis was performed in order to have sufficient power to address the three specific aims. The number of participants required for correlation coefficient analysis was greater than the number of participants required for the regression analyses. Therefore, the number of participants was set using the power analysis for the correlation coefficient. Since little is known about the possible relationship between intrapartum events and postpartum depression, determining effect size was difficult. Considering that this study examined the relationship of several intrapartum events to postpartum depression, a medium effect size of 0.35 was assumed (Cohen, 1988). With N=61 power was predicted at 0.8 to detect a hypothesized correlation coefficient of 0.35 with a significance level at 5%. With N=61 and $R^2$ of .30 the power for multiple regression using all independent variables was 0.9. Although the power analysis indicated that 61 participants would be needed for predicted power of 0.8, an actual sample of 102 was obtained, as this was the accessible sample of women meeting inclusion and exclusion criteria.

Data Collection Procedures

Charts were selected for all participants meeting inclusion and exclusion criteria. Data were extracted from medical records and entered into electronic study files by assigned study member without personal identifiers. Age was collected in years rather than by using birth date to further assure confidentiality of the participants. Further, no
link between study number and medical record number was maintained, and study files consist only of de-identified data.

Demographic data were collected from the charts and included age, employment status, marital status, number of previous pregnancies, number of previous births, and race affiliation. Socio-economic status was assessed by collecting presence of private insurance or Medicaid.

Standard protocol for postpartum care at the critical access facility includes the administration of the Edinburgh Postpartum Depression Scale (EPDS) at two weeks postpartum and again at six weeks postpartum. The results of these screenings were extracted from participants’ medical records.

Instrumentation

All data utilized in the present study were extracted from participants’ medical records. Many intrapartum events, such as vaginal delivery, were measured as dichotomous variables. Other intrapartum events, such as degree of perineal laceration, were continuous variables. Table 1 illustrates the variables and how each variable was measured.
<table>
<thead>
<tr>
<th>Construct</th>
<th>Variable</th>
<th>How Measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td>Age</td>
<td>Age in years</td>
</tr>
<tr>
<td></td>
<td>Marital status</td>
<td>Single, married/civil union divorced/separated/widowed</td>
</tr>
<tr>
<td></td>
<td>Previous pregnancies</td>
<td>Number</td>
</tr>
<tr>
<td></td>
<td>Previous births</td>
<td>Number</td>
</tr>
<tr>
<td></td>
<td>Race/ethnicity</td>
<td>Caucasian, African American, Asian, Hispanic, Other</td>
</tr>
<tr>
<td></td>
<td>Intrapartum Stressor</td>
<td>Number of Stressors</td>
</tr>
<tr>
<td></td>
<td>Vaginal delivery</td>
<td>‘Yes’ or ‘No’</td>
</tr>
<tr>
<td></td>
<td>Cesarean section</td>
<td>‘Yes’ or ‘No’ and planned or unplanned</td>
</tr>
<tr>
<td></td>
<td>Induction of labor</td>
<td>‘Yes’ or ‘No’ and cervical ripening or induction of uterine contractions</td>
</tr>
<tr>
<td></td>
<td>Augmentation of labor</td>
<td>‘Yes’ or ‘No’</td>
</tr>
<tr>
<td></td>
<td>Pitocin given postpartum for hemorrhage</td>
<td>‘Yes’ or ‘No’</td>
</tr>
<tr>
<td></td>
<td>Pain medication</td>
<td>‘Yes’ or ‘No’ and type (systemic, regional, local, or general)</td>
</tr>
<tr>
<td></td>
<td>1st stage of labor &gt;24 hours</td>
<td>‘Yes’ or ‘No’ and length in hours</td>
</tr>
<tr>
<td></td>
<td>2nd stage of labor &gt;2 hours</td>
<td>‘Yes’ or ‘No’ and length in hours</td>
</tr>
<tr>
<td></td>
<td>Postpartum Depression</td>
<td>Edinburgh Postnatal Depression Scale score</td>
</tr>
</tbody>
</table>
Edinburgh Postnatal Depression Scale (EPDS)

The Edinburgh Postnatal Depression Scale (EPDS) was used in this study to screen for PPD and is the most widely used instrument for detecting PPD symptoms (Boyd, Le & Somberg, 2005). The EPDS is a screening tool and is not diagnostic for detection of PPD but has the advantage of being the first scale developed specifically for PPD screening and has been used for more than 20 years in both research and clinical settings.

The EPDS is a 10-item, self-report scale that was validated using a sample of 84 mothers living in Edinburgh or Livingston (Cox, Holden & Sagovsky, 1987). The semi-Likert format has possible ranges of 0 to 30. A threshold of 12/13 was found to identify women with a diagnosis of major depressive illness in the sample (Cox, et al., 1987). The cutoff score has since been adjusted for various populations. Navarro, Ascaso, Garcia-Esteve, Aguado, Torres & Martin-Santos, (2007) reported the EPDS cutoff score as 9/10 in their sample. A cutoff of 14/15 was identified for a sample of Vietnamese-speaking women (Boyd, et al., 2005). Cox, Holden and Sagovsky (1987) reported sensitivity of the EPDS as 86% with specificity of 78% and positive predictive value of 73%, with Jardi, Pelta, Maron, Thomas, Delion, Codaccioni & Gouldmand, (2006) reporting similar findings. The popularity of the EPDS is a result of its short length, ease of use, and its ability to be quickly scored by the healthcare provider.

One major advantage of the EPDS is that the tool is concise. The EPDS does not require an extraordinary amount of time for the client to take the self-administered test and it is easy for the healthcare provider to add the scores and make an evaluation of the
total score. Another advantage is that the EPDS is one of only three instruments developed specifically screen for PPD rather than general depression. The major reason for using the EPDS for this study was the instrument administration was a standard of postpartum care and results were available for two- and six-weeks postpartum. This allowed a chart review to be used for data collection rather than enrolling participants and having to administer the PPD screening instrument longitudinally after they delivered. This saved valuable research resources and time.

The EPDS demonstrates moderate to good reliability properties across samples from a wide variety of countries and languages (Boyd, et al., 2005). Test-retest reliabilities for the EPDS are moderate to good (.53-.74) (Boyd, et al., 2005). Internal consistency for the EPDS has been demonstrated at .73-.87 (Boyd, et al., 2005). In addition, the EPDS demonstrates moderate to good correlations with other depression screening tools (Boyd, et al., 2005).

The EPDS has demonstrated a sensitivity of 59-100% and a specificity of 49-100% (Boyd, et al., 2005). Cox, Holden, and Sagovsky (1987) identified a positive predictive value for the EPDS of 73%.

Data Management

This study was approved by the University of Arizona Institutional Review Board prior to data collection. Data from medical records of qualifying participants were entered directly into SPSS data sheets by study number without personal identifiers. No file exists that could link participant identity to de-identified data in SPSS files. Only the
PI had access to de-identified study files. All computer files are password protected. The de-identified computer files will be kept indefinitely.

Data were cleaned by checking for outliers. Missing data were not an issue, as only participants with Edinburgh Postnatal Depression Scale scores at two-and six-weeks were included in the sample. For one of the regression analyses there were missing data about length of labor. This was managed by deleting the women from the analysis. Despite losing those nine cases, the sample size was still adequate to meet the power analysis.

Data Analysis

Descriptive statistics were calculated for demographic characteristics and were displayed in table format to portray the sample. The independent variable, intrapartum events, was described using frequencies and summation of the mean number of events for the sample. EPDS scores at two- and six-weeks postpartum were described and the scores were divided into risk for depression (13 or more) and no risk for depression. Specific Aim One was answered by describing the frequency of intrapartum events for the sample. Specific Aim Two was answered by summatng PPD scores on the EPDS at two- and at six-weeks postpartum. At each measurement point, the number and percent of the sample to score at risk for depression (13 or more) was described. For Specific Aim Three, Spearman’s Rho was used to identify correlation between number of intrapartum events and EPDS summated scores at two- and six-weeks postpartum. To determine the contribution of specific intrapartum events to variance in EPDS scores, a stepwise regression with backward elimination was constructed with EPDS scores as the
dependent variable. The statistically significant relationships with predictive ability were retained in the model. For all inferential tests, level of significance was set at $\alpha \leq .05$.

Summary

A nonexperimental, descriptive correlational design was used to investigate the relationships between intrapartum events and PPD. Intrapartum events were used to test the stress component of the hypothesized Diathesis-Stress Model of PPD. A chart review of women delivering at a rural, critical access facility was used to obtain data for these analyses. An existing instrument, the EPDS, was used as the screening tool for EPDS.
CHAPTER 4: RESULTS

Introduction

This chapter describes the sample and reviews the results of this non-experimental, descriptive study by specific aims and research question.

Sample

Two hundred fifty births occurred in the identified facility during the 2007 calendar year. Data were collected for 213 of the births but could not be collected for 37 cases because the charts were not present at the time of data collection. Of the 213 cases, one case was excluded because the birth was actually an intrauterine fetal demise with birth of a deceased infant at 20 weeks gestation. Two cases were excluded because the birth occurred at < 37 weeks gestation. One hundred eight cases were excluded due to missing Edinburgh Postnatal Depression Scale (EPDS) score at two- and/or six- weeks postpartum. Therefore, the total sample included in this study was 102 (N=102) women.

The included and excluded cases were examined to determine if demographic differences existed between the two groups. There was no significant difference in the age in years of the included group and the excluded group ($t = .106$) (Table 2). There was also no significant association between race/ethnicity and the two groups ($\chi^2(1) = 1.113, p > .05$). The number of first time mothers was also not significantly different for the two groups ($\chi^2(1) = .002, p > .05$). There was, however, a significant association between the marital status and the two groups ($\chi^2(1) = 4.686, p <.05$), as the included group was more likely to be married than the excluded group.
TABLE 2: Age for Included and Excluded Cases

<table>
<thead>
<tr>
<th></th>
<th>Levine's test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>Age</td>
<td>2.638</td>
<td>0.106</td>
<td>-0.54</td>
</tr>
<tr>
<td></td>
<td>-0.54</td>
<td>210.9</td>
<td>0.59</td>
</tr>
</tbody>
</table>
Characteristics for the sample (N = 102) are shown in Table 3. It is noted that the majority were Caucasian (96.1%) with only one Asian participant (1%) and three participants (2.9%) with unknown race/ethnicity.

TABLE 3: Characteristics of Sample

<table>
<thead>
<tr>
<th>Sample Size</th>
<th>N = 102</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age (SD)</td>
<td>29.03(5.684)</td>
</tr>
<tr>
<td>Marital Status</td>
<td>n(%)</td>
</tr>
<tr>
<td>Married</td>
<td>82(80.4)</td>
</tr>
<tr>
<td>Single</td>
<td>20(19.2)</td>
</tr>
<tr>
<td>Divorced</td>
<td>0(0)</td>
</tr>
<tr>
<td>Widowed</td>
<td>0(0)</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td>n(%)</td>
</tr>
<tr>
<td>Caucasian, non-Hispanic</td>
<td>98(96.1)</td>
</tr>
<tr>
<td>Unknown</td>
<td>3(2.9)</td>
</tr>
<tr>
<td>Asian</td>
<td>1(1)</td>
</tr>
<tr>
<td>Caucasian, Hispanic</td>
<td>0(0)</td>
</tr>
<tr>
<td>African American</td>
<td>0(0)</td>
</tr>
<tr>
<td>Other</td>
<td>0(0)</td>
</tr>
</tbody>
</table>

Research Findings

Specific Aim One

The first specific aim was to describe the number of intrapartum events experienced by women who gave birth in a birthing center located in rural New England during the 2007 calendar year.

The ten intrapartum events (stressors) identified for examination were: 1) labor induction, 2) labor augmentation, 3) perineal laceration, 4) episiotomy, 5) Pitocin administered postpartum, 6) cesarean section, 7) unscheduled cesarean section, 8) use of pain medication, 9) prolonged first stage of labor, and 10) prolonged second stage of labor. Table 4 shows the frequency for each stressor as experienced by the sample. Note
perineal laceration (n = 56) was the stressor experienced by the most women in the sample followed by Pitocin given postpartum (n = 29), labor induction (n = 23), and the use of pain medication (n = 22). Episiotomy (n = 1) was the stressor experienced with the least frequency.

**TABLE 4: Frequency of Stressors**

<table>
<thead>
<tr>
<th>Stressors</th>
<th>Sample Size N = 102</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor Induction</td>
<td>23(22.5)</td>
</tr>
<tr>
<td>Labor Augmentation</td>
<td>10(9.8)</td>
</tr>
<tr>
<td>Perineal Laceration</td>
<td>56(54.9)</td>
</tr>
<tr>
<td>Episiotomy</td>
<td>1(1)</td>
</tr>
<tr>
<td>Pitocin Given Postpartum</td>
<td>29(28.4)</td>
</tr>
<tr>
<td>Cesarean Section</td>
<td>7(6.9)</td>
</tr>
<tr>
<td>Unscheduled Cesarean Section</td>
<td>4(3.9)</td>
</tr>
<tr>
<td>Pain Medication</td>
<td>22(21.6)</td>
</tr>
<tr>
<td>Prolonged First Stage</td>
<td>9(8.8)</td>
</tr>
<tr>
<td>Prolonged Second Stage</td>
<td>6(6.0)</td>
</tr>
</tbody>
</table>

**Specific Aim Two**

The second specific aim was to describe PPD scores on the Edinburgh Postpartum Depression Scale (EPDS) at two- and six- weeks postpartum for the sample.

Women in this sample had a range of EPDS scores. Although the possible range for EPDS scores is 0-30, the actual range of scores at two weeks was 0-24 and the actual range at six weeks was 0-19 (Table 5). More women (n = 16 at two weeks and n = 29 at six weeks) reported zero on the EPDS score at both two- and six- weeks postpartum than any other score.
TABLE 5: Frequency of EPDS Scores at Two and Six Weeks Postpartum

<table>
<thead>
<tr>
<th>EPDS Score</th>
<th>Frequency at Two Weeks (%)</th>
<th>Frequency at Six Weeks (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>16(15.7)</td>
<td>29(28.4)</td>
</tr>
<tr>
<td>1</td>
<td>12(11.8)</td>
<td>11(10.8)</td>
</tr>
<tr>
<td>2</td>
<td>7(6.9)</td>
<td>9(8.8)</td>
</tr>
<tr>
<td>3</td>
<td>11(10.8)</td>
<td>9(8.8)</td>
</tr>
<tr>
<td>4</td>
<td>7(6.9)</td>
<td>13(12.7)</td>
</tr>
<tr>
<td>5</td>
<td>9(8.8)</td>
<td>5(4.9)</td>
</tr>
<tr>
<td>6</td>
<td>12(11.8)</td>
<td>8(7.8)</td>
</tr>
<tr>
<td>7</td>
<td>8(7.8)</td>
<td>4(3.9)</td>
</tr>
<tr>
<td>8</td>
<td>5(4.9)</td>
<td>5(4.9)</td>
</tr>
<tr>
<td>9</td>
<td>2(2.0)</td>
<td>1(1.0)</td>
</tr>
<tr>
<td>10</td>
<td>4(3.9)</td>
<td>1(1.0)</td>
</tr>
<tr>
<td>11</td>
<td>2(2.0)</td>
<td>2(2.0)</td>
</tr>
<tr>
<td>12</td>
<td>2(2.0)</td>
<td>1(1.0)</td>
</tr>
<tr>
<td>13</td>
<td>1(1.0)</td>
<td>3(2.9)</td>
</tr>
<tr>
<td>14</td>
<td>2(2.0)</td>
<td>0(0.0)</td>
</tr>
<tr>
<td>17</td>
<td>1(1.0)</td>
<td>0(0.0)</td>
</tr>
<tr>
<td>19</td>
<td>0(0.0)</td>
<td>1(1.0)</td>
</tr>
<tr>
<td>24</td>
<td>1(1.0)</td>
<td>0(0.0)</td>
</tr>
<tr>
<td>Total</td>
<td>102</td>
<td>102</td>
</tr>
</tbody>
</table>

Specific Aim Three

The third specific aim was to explore the relationship between number of postpartum events and Edinburgh Postnatal Depression Scale (EPDS) scores in women in this sample at two- and six- weeks postpartum. This specific aim is answered in the two research questions as described below.

Research question 1: Does the number of intrapartum events have a relationship with the EPDS score at both two- and six- weeks postpartum? To answer this research question, Spearman’s rho was used to examine nonparametric correlations between EPDS score at two- and six- weeks postpartum and the number of stressors. The ten
stressors included in these analyses were: 1) labor induction, 2) labor augmentation, 3) perineal laceration, 4) episiotomy, 5) Pitocin administered postpartum, 6) cesarean section, 7) unscheduled cesarean section, 8) any use of pain medication, 9) prolonged first stage of labor, and 10) prolonged second stage of labor. Each participant had the possibility of having zero to ten stressors. Table 6 shows the frequency of stressors for this sample. None of the participants experienced more than five stressors and 17 (16.7%) experienced no stressors.

**TABLE 6: Number of Stressors**

<table>
<thead>
<tr>
<th>Number of Stressors</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>17(16.7)</td>
</tr>
<tr>
<td>1</td>
<td>42(41.2)</td>
</tr>
<tr>
<td>2</td>
<td>21(20.6)</td>
</tr>
<tr>
<td>3</td>
<td>12(11.8)</td>
</tr>
<tr>
<td>4</td>
<td>3(2.9)</td>
</tr>
<tr>
<td>5</td>
<td>7(6.9)</td>
</tr>
</tbody>
</table>

Table 7 shows the results of the nonparametric correlation analyses. At two weeks postpartum, the number of intrapartum stressors was not significantly correlated with EPDS scores (p = .206). However, EPDS scores at six weeks postpartum were significantly correlated with the number of intrapartum stressors (p = .014). Of interest is also the finding that EPDS scores at two weeks and six weeks postpartum are significantly correlated.
TABLE 7: Correlation of EPDS with Number of Intrapartum Stressors at Two and Six Weeks Postpartum

<table>
<thead>
<tr>
<th>Stressors</th>
<th>EPDS score 2 weeks</th>
<th>EPDS score 6 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman's rho</td>
<td>Correlation Coefficient</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>102</td>
</tr>
</tbody>
</table>

| EPDS score at 2 weeks | Correlation Coefficient | .126 | 1 | --- |
| | Sig. (2-tailed) | .206 | . | --- |
| | N | 102 | 102 | --- |

| EPDS score at 6 weeks | Correlation Coefficient | .242* | 0.718** | 1 |
| | Sig. (2-tailed) | .014 | .000 | . |
| | N | 102 | 102 | 102 |

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

Research question 2: Do some intrapartum events have more significant relationships to Edinburgh Postnatal Depression Scale scores than other intrapartum events? To answer this question, a stepwise regression with backward elimination was used for all ten intrapartum stressors at both two- and six- weeks. All ten possible explanatory predictors (the intrapartum stressors) were put into the regression equation and then removed, one at a time, until the remaining predictors were all significant. This resulted in a remaining model with perineal laceration (p = .040) and unscheduled cesarean section (p = .087) as significant predictors of EPDS score at two weeks (Table 8). It should be noted that unscheduled cesarean section had a significance level above the .05 threshold. This is because conventional criteria for including or eliminating predictors in the model is significance levels up to .10. Since the unscheduled cesarean...
section variable does not meet apriori significance of \( \leq 0.05 \), it cannot be considered to be a significant predictor of PPD. It does, however, approach significance.

The regression coefficients indicated that those who experienced perineal lacerations are predicted to have an increase in EPDS scores at two weeks postpartum of 1.782. Those who had an unscheduled cesarean section are predicted to have an increase in EPDS scores at two weeks of 4.31. Although perineal laceration and unscheduled cesarean section are significant predictors of EPDS score at two weeks postpartum, the R-square values in Table 9 show that they explain only 6% of the variance in EPDS score.
### TABLE 8: Stepwise Regression at Two Weeks Postpartum

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(constant)</td>
<td>4.082</td>
<td>.803</td>
</tr>
<tr>
<td>Labor Induction</td>
<td>-1.981</td>
<td>1.093</td>
</tr>
<tr>
<td>Labor Augmentation</td>
<td>-1.302</td>
<td>1.539</td>
</tr>
<tr>
<td>Perineal Laceration</td>
<td>1.359</td>
<td>.940</td>
</tr>
<tr>
<td>Episiotomy</td>
<td>.296</td>
<td>4.857</td>
</tr>
<tr>
<td>Pitocin Postpartum</td>
<td>.136</td>
<td>.994</td>
</tr>
<tr>
<td>Cesarean Section</td>
<td>-1.132</td>
<td>2.885</td>
</tr>
<tr>
<td>Unscheduled C-Sect</td>
<td>4.639</td>
<td>4.034</td>
</tr>
<tr>
<td>Pain Medication</td>
<td>1.672</td>
<td>1.392</td>
</tr>
<tr>
<td>Prolonged First Stage</td>
<td>-.691</td>
<td>2.031</td>
</tr>
<tr>
<td>Prolonged Second Stage</td>
<td>2.573</td>
<td>2.096</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(constant)</td>
<td>4.079</td>
<td>.804</td>
</tr>
<tr>
<td>Labor Induction</td>
<td>-1.977</td>
<td>1.085</td>
</tr>
<tr>
<td>Labor Augmentation</td>
<td>-1.297</td>
<td>1.528</td>
</tr>
<tr>
<td>Perineal Laceration</td>
<td>1.362</td>
<td>.933</td>
</tr>
<tr>
<td>Pitocin Postpartum</td>
<td>.128</td>
<td>.980</td>
</tr>
<tr>
<td>Cesarean Section</td>
<td>-1.146</td>
<td>2.861</td>
</tr>
<tr>
<td>Unscheduled C-Sect</td>
<td>4.670</td>
<td>3.981</td>
</tr>
<tr>
<td>Pain Medication</td>
<td>1.690</td>
<td>1.351</td>
</tr>
<tr>
<td>Prolonged First Stage</td>
<td>-.720</td>
<td>1.962</td>
</tr>
<tr>
<td>Prolonged Second Stage</td>
<td>2.623</td>
<td>1.921</td>
</tr>
</tbody>
</table>
TABLE 8: Stepwise Regression at Two Weeks Postpartum - *Continued*

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>3 (constant)</td>
<td>4.103</td>
<td>.778</td>
<td>5.272</td>
<td>.000</td>
</tr>
<tr>
<td>Labor Induction</td>
<td>-1.979</td>
<td>1.079</td>
<td>-1.96</td>
<td>-1.835</td>
</tr>
<tr>
<td>Labor Augmentation</td>
<td>-1.249</td>
<td>1.476</td>
<td>-.08</td>
<td>-.847</td>
</tr>
<tr>
<td>Perineal Laceration</td>
<td>1.366</td>
<td>.927</td>
<td>.160</td>
<td>1.473</td>
</tr>
<tr>
<td>Cesarean Section</td>
<td>-1.157</td>
<td>2.844</td>
<td>-.065</td>
<td>-.407</td>
</tr>
<tr>
<td>Unscheduled C-Sect</td>
<td>4.727</td>
<td>3.935</td>
<td>.190</td>
<td>1.201</td>
</tr>
<tr>
<td>Pain Medication</td>
<td>1.720</td>
<td>1.324</td>
<td>.165</td>
<td>1.299</td>
</tr>
<tr>
<td>Prolonged First Stage</td>
<td>-.734</td>
<td>1.949</td>
<td>-.050</td>
<td>-.377</td>
</tr>
<tr>
<td>Prolonged Second Stage</td>
<td>2.629</td>
<td>1.910</td>
<td>.147</td>
<td>1.376</td>
</tr>
<tr>
<td>4 (constant)</td>
<td>4.116</td>
<td>.774</td>
<td>5.318</td>
<td>.000</td>
</tr>
<tr>
<td>Labor Induction</td>
<td>-1.991</td>
<td>1.073</td>
<td>-1.98</td>
<td>-1.855</td>
</tr>
<tr>
<td>Labor Augmentation</td>
<td>-1.299</td>
<td>1.463</td>
<td>-.092</td>
<td>-.888</td>
</tr>
<tr>
<td>Perineal Laceration</td>
<td>1.334</td>
<td>.919</td>
<td>.156</td>
<td>1.451</td>
</tr>
<tr>
<td>Cesarean Section</td>
<td>-1.028</td>
<td>2.810</td>
<td>-.058</td>
<td>-.366</td>
</tr>
<tr>
<td>Unscheduled C-Sect</td>
<td>3.997</td>
<td>3.409</td>
<td>.161</td>
<td>1.173</td>
</tr>
<tr>
<td>Pain Medication</td>
<td>1.579</td>
<td>1.264</td>
<td>.152</td>
<td>1.249</td>
</tr>
<tr>
<td>Prolonged Second Stage</td>
<td>2.477</td>
<td>1.859</td>
<td>.139</td>
<td>1.333</td>
</tr>
<tr>
<td>5 (constant)</td>
<td>4.041</td>
<td>.743</td>
<td>5.440</td>
<td>.000</td>
</tr>
<tr>
<td>Labor Induction</td>
<td>-1.909</td>
<td>1.045</td>
<td>-1.90</td>
<td>-1.827</td>
</tr>
<tr>
<td>Labor Augmentation</td>
<td>-1.209</td>
<td>1.435</td>
<td>-.086</td>
<td>-.843</td>
</tr>
<tr>
<td>Perineal Laceration</td>
<td>1.423</td>
<td>.882</td>
<td>.167</td>
<td>1.613</td>
</tr>
<tr>
<td>Unscheduled C-Sect</td>
<td>3.222</td>
<td>2.658</td>
<td>.130</td>
<td>1.212</td>
</tr>
<tr>
<td>Pain Medication</td>
<td>1.374</td>
<td>1.128</td>
<td>.132</td>
<td>1.218</td>
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<td>Prolonged Second Stage</td>
<td>2.526</td>
<td>1.845</td>
<td>.141</td>
<td>1.369</td>
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</table>
### TABLE 8: Stepwise Regression at Two Weeks Postpartum - *Continued*

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>(constant)</td>
<td>3.800</td>
<td>.684</td>
<td>5.552</td>
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<tr>
<td></td>
<td>Labor Induction</td>
<td>-1.825</td>
<td>1.039</td>
<td>-.181</td>
</tr>
<tr>
<td></td>
<td>Perineal Laceration</td>
<td>1.605</td>
<td>.854</td>
<td>.188</td>
</tr>
<tr>
<td></td>
<td>Unscheduled C-Sect</td>
<td>3.487</td>
<td>2.635</td>
<td>.140</td>
</tr>
<tr>
<td></td>
<td>Pain Medication</td>
<td>1.322</td>
<td>1.124</td>
<td>.127</td>
</tr>
<tr>
<td></td>
<td>Prolonged Second Stage</td>
<td>2.585</td>
<td>1.841</td>
<td>.145</td>
</tr>
<tr>
<td>7</td>
<td>(constant)</td>
<td>3.960</td>
<td>.672</td>
<td>5.893</td>
</tr>
<tr>
<td></td>
<td>Labor Induction</td>
<td>-1.581</td>
<td>1.020</td>
<td>-.157</td>
</tr>
<tr>
<td></td>
<td>Perineal Laceration</td>
<td>1.622</td>
<td>.855</td>
<td>.190</td>
</tr>
<tr>
<td></td>
<td>Unscheduled C-Sect</td>
<td>4.567</td>
<td>2.475</td>
<td>.184</td>
</tr>
<tr>
<td></td>
<td>Prolonged Second Stage</td>
<td>2.909</td>
<td>1.824</td>
<td>.163</td>
</tr>
<tr>
<td>8</td>
<td>(constant)</td>
<td>3.639</td>
<td>.644</td>
<td>5.651</td>
</tr>
<tr>
<td></td>
<td>Perineal Laceration</td>
<td>1.637</td>
<td>.862</td>
<td>.192</td>
</tr>
<tr>
<td></td>
<td>Unscheduled C-Sect</td>
<td>4.361</td>
<td>2.489</td>
<td>.175</td>
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<tr>
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<td>Prolonged Second Stage</td>
<td>2.163</td>
<td>1.772</td>
<td>.121</td>
</tr>
<tr>
<td>9</td>
<td>(constant)</td>
<td>3.690</td>
<td>.644</td>
<td>5.729</td>
</tr>
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<td></td>
<td>Perineal Laceration</td>
<td>1.782</td>
<td>.856</td>
<td>.209</td>
</tr>
<tr>
<td></td>
<td>Unscheduled C-Sect</td>
<td>4.310</td>
<td>2.495</td>
<td>.173</td>
</tr>
</tbody>
</table>

a. Dependent Variable: EPDS score at 2 weeks
TABLE 9: Two Week Model Variance

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.346</td>
<td>.120</td>
<td>.021</td>
<td>4.217</td>
</tr>
<tr>
<td>2</td>
<td>.346</td>
<td>.120</td>
<td>.032</td>
<td>4.194</td>
</tr>
<tr>
<td>3</td>
<td>.346</td>
<td>.119</td>
<td>.042</td>
<td>4.171</td>
</tr>
<tr>
<td>4</td>
<td>.344</td>
<td>.118</td>
<td>.051</td>
<td>4.152</td>
</tr>
<tr>
<td>5</td>
<td>.342</td>
<td>.17</td>
<td>.060</td>
<td>4.132</td>
</tr>
<tr>
<td>6</td>
<td>.332</td>
<td>.110</td>
<td>.063</td>
<td>4.126</td>
</tr>
<tr>
<td>7</td>
<td>.311</td>
<td>.097</td>
<td>.059</td>
<td>4.134</td>
</tr>
<tr>
<td>8</td>
<td>.272</td>
<td>.074</td>
<td>.045</td>
<td>4.164</td>
</tr>
<tr>
<td>9</td>
<td>.244</td>
<td>.060</td>
<td>.040</td>
<td>4.175</td>
</tr>
</tbody>
</table>

The process was then repeated for EPDS scores at six weeks postpartum as the dependent variable. All ten possible explanatory predictors were again put into the regression equation and then removed, one at a time, until the remaining predictors were all significant. This resulted in a model with prolonged second stage of labor (p = .021) and cesarean section (p = .012) as significant predictors of EPDS score at six weeks (Table 10). Table 11 shows that this model explains 11% of the variance in EPDS score.
TABLE 10: Stepwise Regression at Six Weeks Postpartum

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
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TABLE 10: Stepwise Regression at Six Weeks Postpartum - Continued

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### TABLE 10: Stepwise Regression at Six Weeks Postpartum - Continued

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<td>1.522</td>
<td>.226</td>
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a. Dependent Variable: EPDS score at 6 weeks
TABLE 11: Six Week Model Variance

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<th>Model</th>
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<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimates</th>
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<td>.141</td>
<td>.045</td>
<td>3.690</td>
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<td>2</td>
<td>.375</td>
<td>.141</td>
<td>.055</td>
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<td>3</td>
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<td>7</td>
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<td>.105</td>
<td>.087</td>
<td>3.608</td>
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</table>

The regression coefficients indicate those who experienced a prolonged second stage of labor were predicted to have an increase in EPDS scores at six weeks postpartum of 3.576. Those who had a cesarean section, regardless of whether or not it was scheduled, were predicted to have an increase in EPDS scores at six weeks postpartum of 3.909.

Raw data suggested either prolonged first stage of labor, prolonged second stage of labor or the total length of labor should be examined as a possible predictor of EPDS score at two- and six- weeks postpartum. Pearson’s product-moment correlation coefficient was used to measure the strength of the relationship between total length of labor (length of first stage plus length of second stage) and EPDS scores at two- and six-weeks postpartum. These analyses showed total length of labor was not correlated with EPDS scores at two- or six- weeks. It should be noted sample size for total length of labor was only 93 women rather than the expected total sample of 102. This is because nine of
the charts had missing data and were excluded. These nine charts were missing length of first stage of labor, length of second stage of labor, or both.

There were three points at which women may have received Pitocin: 1) to induce labor, 2) to augment labor, or 3) to stop postpartum hemorrhage. Raw data suggested the examination of whether or not any administration of Pitocin had a relationship with EPDS scores at two- and/or six- weeks postpartum regardless of the time of administration or the reason for administration. An independent t-test was used to examine the relationship between Pitocin and EPDS score at two- and/or six- weeks postpartum (Table 12). Forty one (40.2%) of the 102 women in the sample received Pitocin at least once during their labor process. The t-test indicated there was no significant difference in EPDS scores at two weeks ($t(100) = .348, p > .05$) or six weeks ($t(100) = -.604, p > .05$) postpartum for women who did or did not receive Pitocin.
TABLE 12: Two and Six Week EPDS Scores for Pitocin and No Pitocin

<table>
<thead>
<tr>
<th>EPDS Score at</th>
<th>Equal Variances Assumed</th>
<th>Equal Variances Not Assumed</th>
<th>Equal Variances Assumed</th>
<th>Equal Variances Not Assumed</th>
</tr>
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</table>
Summary

EPDS scores at two weeks postpartum are not significantly correlated with the number of intrapartum stressors. However, perineal laceration and unscheduled cesarean section are significant predictors of EPDS score at two weeks postpartum. EPDS scores at six weeks postpartum are significantly correlated with the number of intrapartum stressors. In addition, having a prolonged second stage of labor and having a cesarean section are significant predictors of EPDS at six weeks postpartum. The total length of labor was not correlated with EPDS scores at two- or six-weeks postpartum and there was no significant difference in the EPDS scores between women who were given Pitocin and women who were not given Pitocin.
CHAPTER 5: DISCUSSION

Introduction

This chapter elaborates upon the research findings, examines how the specific aims and research questions were addressed, and discusses the implications of this research for the nursing profession and patient outcomes.

Discussion

Sample

Of the 213 cases for which data were collected, the final sample contained only 102 participants (N = 102). More than 50% of the cases were excluded due to missing EPDS scores at two weeks, six weeks, or at both two- and six- weeks. The only statistical difference found between the two groups (included cases and excluded cases) was included women were more likely to be married than excluded women. Surprisingly, 100% of the included cases were women who received care from Certified Nurse Midwives. All women cared for by physicians were excluded due to lack of one or both EPDS scores. This is an interesting finding, since it is the perception of the combined OB/GYN practice (both Certified Nurse Midwives and physicians) that all of their clients are screened for PPD at two- and six- weeks postpartum. It may be that Certified Nurse Midwives are better educated to understand the importance of detecting PPD as a way to determine need for interventions that avert or ameliorate the known negative effects. It may also reflect practice differences or professional focus. This finding, however, does speak to a need for greater PPD education for healthcare professionals, particularly physicians, who interact with women postpartum and manage their care.
Although the two groups (included cases and excluded cases) were not significantly different in race/ethnicity, this is mostly due to the fact that the vast majority (96.1% of included women and 92.7% of excluded women) classified themselves as non-Hispanic Caucasian women. It is worth mentioning that women were not included or excluded from this study based on race or ethnicity. The homogeneity of the sample is a function of the rural setting in which this sample was obtained. Results may differ when obtained from samples of women who are ethnically diverse, who live in geographically distinct areas, or who are from urban settings.

Specific Aim One

The first specific aim was to describe the number of intrapartum events experienced by women who gave birth in a birthing center located in rural New England during the 2007 calendar year.

Perineal laceration ($n = 56$) was the stressor experienced by the most women in the sample followed by Pitocin administration postpartum ($n = 29$). Episiotomy ($n = 1$) was the stressor experienced with the least frequency, with only one participant. These findings are not surprising, as the obstetric practice from which the sample was obtained is known in the community for its support of low-intervention childbirth. Women with significant health issues are transferred to one of two major medical centers for their prenatal and intrapartum care. The frequency of stressors experienced by women is expected to be different in a major medical center or in a facility that cares for medically high risk pregnancies.
The description of the number of intrapartum events experienced by women of this sample adds to what is currently known about PPD. Current research focuses on the relationship between one or two intrapartum events and PPD. I am unaware of any other research that has explored such a wide array of intrapartum events in relation to PPD.

Specific Aim Two

The second specific aim was to describe PPD scores on the Edinburgh Postpartum Depression Scale at two- and six- weeks postpartum for the sample. Although the possible range for EPDS scores is 0-30, the actual range of scores at two weeks was 0-24 and the actual range at six weeks was 0-19. There were no outliers. Literature indicates rates of PPD during the first six months postpartum are 10-22% in all women (Cox, et al., 1993; Llewellyn, et al., 1997). The present sample had EPDS scores of 13 + (indicating high risk for PPD) of only 6% at two weeks postpartum and 4% at six weeks postpartum. It may be women who live in rural settings have lower PPD prevalence, or it may be women who deliver in a low risk facility and have fewer intrapartum events (stressors) have lower PPD prevalence. This finding warrants further exploration and research to tease out the specific contributions of rural place vs. lower numbers of intrapartum events to PPD prevalence.

Specific Aim Three

The third specific aim was to explore the relationship between number of postpartum events and EPDS scores in women in this sample at two- and six- weeks postpartum. In this sample (57.9%) experienced zero or one stressor.
Nonparametric correlation analysis indicated that number of stressors is *not* significantly correlated with EPDS scores at two weeks but number of stressors *is* significantly correlated with EPDS scores at six weeks postpartum. This is a curious finding, as it would seem a more immediate response to cumulative stressors likely. This delayed response to cumulative stressors may be due to increasing fatigue, to physiologic factors, or to heretofore unidentified factors. It would be interesting to examine this relationship in a more diverse sample of women who experienced more intrapartum stressors.

Interestingly, the results of Specific Aim Three might aid in explaining the results of Specific Aim Two. Specific Aim Two showed that only 6% of this sample reported EPDS scores that indicated risk for PPD. This is much below the expected 10-22% of PPD in all women. However, Specific Aim Three showed that EPDS score is significantly correlated with EPDS scores at six weeks postpartum and that the majority of this sample experienced zero or one stressor. The low number of stressors experienced by this group might explain the lower than expected EPDS risk. These findings warrant further exploration and additional research.

At two weeks postpartum, perineal laceration predicted EPDS scores. Unscheduled cesarean section approached significance in the final model. In future studies with diverse and high risk samples, this relationship may be clarified. Findings may differ in groups with cesarean section rates that approach the national average. Only 6.9% of the present sample experienced scheduled or unscheduled cesarean sections.
At six weeks postpartum, prolonged second stage of labor and cesarean section were significant predictors of EPDS scores. This corresponds to the findings of Edwards, et al., (1993), who reported a significantly higher incidence of postnatal depression among participants who had undergone c-section than those who had a vaginal delivery. These findings would be stronger if the stressors predicting EPDS scores at two weeks postpartum would be the same stressors that predict EPDS scores at six weeks. Interestingly, Forman, et al., (2000) reported no association between pregnancy or delivery complications and PPD while my results show certain intrapartum events as predictors for EPDS score. This difference may be explained by different instruments used to detect PPD or by differences in sample characteristics.

Prolonged second stage of labor was included in the model that predicted EPDS scores at six weeks postpartum. Although, raw data suggested total length of labor be examined as a possible predictor or EPDS score at two- and six- weeks postpartum, no correlation was detected. This is an interesting and unexpected finding that warrants further research. If total length of labor had been found to have correlation with EPDS scores at two- and/or six- weeks postpartum, fatigue would have been an obvious area to explore. Since total length of labor was not found to have correlation with EPDS scores in this sample, the significance of second stage of labor rises to the surface. There could be something specific to second stage of labor that affects PPD. One possible area to explore is the role of physiologic factors such as hormones. Such physiologic events may explain some of the variance in PPD and warrants investigation.
The fact that Pitocin administration was not indicated in the models that predict EPDS scores at two- or six-weeks postpartum was an unexpected finding. It was noted that there were three points at which women may have received Pitocin: 1) to induce labor, 2) to augment labor, and 3) to stop postpartum hemorrhage. Raw data suggested that it was worth examining whether or not any administration of Pitocin had a relationship with EPDS scores at two- and/or six-weeks postpartum regardless of the time or reason of administration. Forty one (40.2%) of the 102 women in the sample received Pitocin at least once during their labor process and the t-test indicated that, in this sample, there was no significant difference in EPDS scores at two weeks or six weeks postpartum for women who did or did not receive Pitocin.

Experience and clinical observation suggested that Pitocin is a factor in the difficult transition that some women have to motherhood. Thus the findings in this study were unexpected and warrant further exploration. Pitocin is frequently administered to women who already have a dysfunctional labor pattern and are, therefore, already at risk for complication including cesarean section. Administering Pitocin also requires additional interventions such as IV canulation and continuous electronic fetal monitoring. Perhaps the Pitocin is not the variable of interest and other variables should be explored.

**Diathesis-Stress Model**

The findings of this study provide partial support of the proposed Diathesis-Stress Model of PPD. It was interesting to find that number of stressors had a significant relationship with EPDS scores at six weeks postpartum. In addition, the regression models provided information that implicates some intrapartum stressors as predictors for
EPDS scores of the women in this sample. These findings warrant further testing of the model, with inclusion of the diathesis component in addition to the stressor component, in order to completely test the model.

Limitations

This study explored postpartum depression in a very under-represented population – rural women. However, this positive feature also limits the generalizability of the findings to women living in other geographic locations. While race and ethnicity were not inclusion or exclusion factors in sample selection, the fact that this sample consisted almost entirely of Caucasian women is another limitation.

Missing data were a significant limitation. All women who received obstetric care from the physicians of the identified practice were excluded due to missing EPDS scores. It might be valuable to explore whether the providers’ profession (Certified Nurse Midwife or physician) accounted for any variation in EPDS scores. This potential relationship can only be investigated with equal provider representation. In the present study, all participants were cared for by Certified Nurse Midwives.

Being a retrospective examination of medical records, another limitation was the level of control over initial data collection methods. It is not clear how the EPDS scale was administered and whether or not there was interrater reliability, since each provider administered the scale themselves. While the retrospective design of this study is a limitation, it should also be mentioned that the retrospective design of this study allowed for a very important finding. This study identified the gap in the providers’ perceived care and the care that the providers actually provide, illustrating a need for education for
the providers. The retrospective design allowed for the examination of actual practice. This finding may not have been identified in a prospective study.

Additionally, this study examined women who are at risk for PPD rather than women who actually suffer from PPD. The EPDS screens for depression but does not actually diagnose depression. Therefore, relationships between intrapartum events and actual PPD were not explored.

Significance of Research Findings

The findings from the present study have great significance. The sample was obtained from an obstetric care practice that assumes all clients are screened for PPD at two- and six-weeks postpartum. In fact 108 (50.7%) of the 213 women who delivered in 2007 were excluded due to missing EPDS scale scores at two- and/or six-weeks postpartum. It is surprising to learn that half of the women who received care at the identified obstetric practice did not receive the screening believed to be performed. While all of the women receiving care from the physicians of the practice were excluded, there were also Certified Nurse Midwife clients who were excluded due to missing EPDS scale scores. This finding suggests a need for further education for obstetric providers about the importance of screening for EPDS.

Findings from this study provided some support for previous research that suggests a relationship between cesarean section and PPD. The relationship was not robust, in that cesarean section explained less than 10% of the variance in PPD screening scores. However, the present sample had a lower cesarean section rate than samples in
other studies and this finding from rural women who delivered in a low risk facility will be an important addition to the literature.

The findings of this research offer an important opportunity to nurses who care for childbearing women. Nurses caring for childbearing women are uniquely poised to educate women about PPD. With the knowledge that certain intrapartum events are predictors of EPDS scores, nurses can alert women to the potential risk and encourage early reporting of signs/symptoms. Nurses working in obstetric offices can play an important role in advocating for the PPD screening of all postpartum women. Increased reporting can reduce the number of unidentified cases and promote interventions that avert devastating emotional, physical, and economic consequences.

Implications for Future Research

This research should be replicated using samples from more diverse populations. There are also additional opportunities to explore the relationship between the second stage of labor and PPD. Most importantly, a prospective study would be the logical next step. A prospective study would allow for more control over the research methods. A prospective study would also allow for the testing of the complete Diathesis-Stress Model whereas this study focused on the stress component of the model.

Summary

Through this research study, I was able to determine that EPDS scores at two weeks postpartum are not significantly correlated with the number of intrapartum stressors. However, at two weeks postpartum, perineal laceration and unscheduled cesarean section are significant predictors of EPDS scores. EPDS scores at six weeks
postpartum are significantly correlated with the number of intrapartum stressors. In addition, having a prolonged second stage of labor and having a cesarean section are significant predictors of EPDS at six weeks postpartum. The total length of labor was not correlated with EPDS scores at two- or six-weeks postpartum and there was no significant difference in the EPDS scores between women who were given Pitocin and women who were not given Pitocin.

This research also indicated a need for continued research and exploration. Most importantly, though, this research illuminated the need for further education for healthcare providers about the importance of PPD screening. Nurses can play an important role in this education process. Nurses are also uniquely poised to educate women about possible increased risk of PPD as determined by their intrapartum experiences.
APPENDIX A:

EDINBURGH POSTNATAL DEPRESSION SCALE (EPDS)
Edinburgh Postnatal Depression Scale\(^1\) (EPDS)

Name: ________________________________ Address: ________________________________

Your Date of Birth: ____________________ Phone: ________________________________

Baby's Date of Birth: _________________

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
- No, not very often
- No, not at all

This would mean: "I have felt happy most of the time" during the past week.

Please complete the other questions in the same way.

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
   - 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, 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 ___________________________


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Edinburgh Postnatal Depression Scale\(^1\) (EPDS)

Postpartum depression is the most common complication of childbirth\(^2\). The 10-question Edinburgh Postnatal Depression Scale (EPDS) is a valuable and efficient way of identifying patients at risk for "perinatal" depression. The EPDS is easy to administer and has proven to be an effective screening tool.

Mothers who score above 13 are likely to be suffering from a depressive illness of varying severity. The EPDS score should not override clinical judgment. A careful clinical assessment should be carried out to confirm the diagnosis. The scale indicates how the mother has felt during the previous week. In doubtful cases it may be useful to repeat the tool after 2 weeks. The scale will not detect mothers with anxiety neuroses, phobias or personality disorders.

Women with postpartum depression need not feel alone. They may find useful information on the websites of the National Women's Health Information Center <www.nwhin.gov> and from groups such as Postpartum Support International <www.ches.iupui.edu/postpartum> and Depression after Delivery <www.depressionafterdelivery.com>.

**SCORING**

**QUESTIONS 1, 2, & 4 (without an *)**
Are scored 0, 1, 2 or 3 with top box scored as 0 and the bottom box scored as 3.

**QUESTIONS 3, 5-10 (marked with an *)**
Are reverse scored, with the top box scored as a 3 and the bottom box scored as 0.

Maximum score: 30
- Possible Depression: 10 or greater
- Always look at item 10 (suicidal thoughts)

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**Instructions for using the Edinburgh Postnatal Depression Scale:**

1. The mother is asked to check the response that comes closest to how she has been feeling in the previous 7 days.

2. All the items must be completed.

3. Care should be taken to avoid the possibility of the mother discussing her answers with others. (Answers come from the mother or pregnant woman.)

4. The mother should complete the scale herself, unless she has limited English or has difficulty with reading.


APPENDIX B:

UNIVERSITY OF ARIZONA INSTITUTIONAL REVIEW BOARD (IRB)

APPROVAL
8 September 2008

Heather Evans, Ph.D. Candidate
Advisor: Judy Berg, Ph.D.
College of Nursing
PO Box 210203

**RE: POSTPARTUM DEPRESSION: DO INTRAPARTUM EVENTS MATTER?**

Dear Ms. Evans:

We received documents concerning your above cited project. Regulations published by the U.S. Department of Health and Human Services [45 CFR Part 46.101(b)(4)] exempt this type of research from review by our Institutional Review Board.

Exempt status is granted with the understanding that no further changes or additions will be made to the procedures followed (copies of which we have on file) without the review and approval of the Human Subjects Committee and your College or Departmental Review Committee.

Thank you for informing us of your work. If you have any questions concerning the above, please contact this office.

Sincerely,

Rebecca Dahl, R.N., Ph.D.
Director
Human Subjects Protection Program

cc: Departmental/College Review Committee
15 October 2008

Heather Evans, Ph.D. Candidate
Advisor: Judy Berg, Ph.D.
College of Nursing
PO Box 210203

RE: POSTPARTUM DEPRESSION: DO INTRAPARTUM EVENTS MATTER?

Dear Ms. Evans:

We received your Request for Amendment form concerning your above cited project. Request is to add Alan Howard as study personnel. Approval for this change to your exempt project is granted effective 15 October 2008.

Continued exempt status is granted with the understanding that no further changes or additions will be made to the procedures followed (copies of which we have on file) without the review and approval of the Human Subjects Committee and your College or Departmental Review Committee.

Thank you for informing us of your work. If you have any questions concerning the above, please contact this office.

Sincerely,

Rebecca Dahl, R.N., Ph.D.
Director
Human Subjects Protection Program
APPENDIX C:

FACILITY CONSENT FORM
GIFTOU MEDICAL CENTER
PATIENT AUTHORIZATION RECORD – PLEASE READ CAREFULLY

IMPORTANT INFORMATION ABOUT YOUR HOSPITAL ADMISSION

CONSENT TO TREATMENT
Your hospital care will be provided according to your attending physician's orders. For major procedures, such as surgery, you will be asked to sign a separate consent form. By agreeing to be admitted/ER treatment, however, you are consenting generally to other medical treatments such as X-ray examinations, laboratory tests and minor procedures that are deemed necessary or advisable by the provider responsible for your care.

MEDICAL OR SCIENTIFIC RESEARCH
Gifford Medical Center (GMC) will provide medical records information to qualified researchers who measure the results of treatment. The information is separated from any patient identification before being released outside this institution. If tissue fluids are removed from your body and are no longer needed for your medical care, GMC may use these substances for teaching, research or quality control studies.

PATIENT RIGHTS AND ADVANCE DIRECTIVES
Hospital patients have specific rights under State and Federal law. You have received an explanation of your rights as a patient. Room rates vary with the level of care provided; the most common room rate is $____ (as of date). Additional information about room rates is available upon request.

You have the right to complete a living will and select a durable power of attorney for health care. You have received a summary of GMC Advanced Directive Policy and an Advanced Directive information brochure, which includes the documents and instructions to initiate Advanced Directives if you so desire.

PERSONAL BELONGINGS
GMC cannot be responsible for your personal belongings. If you wish to keep items with you in the hospital, you may request that they be placed in the hospital safe.

VISITORS/TELEPHONE CALLS
Unless you request otherwise, GMC will provide your room location or telephone number to visitors and callers.

RELEASE OF RESPONSIBILITY FOR PARKED VEHICLE
I absolve the hospital from any and all responsibility for damage to, or theft of my vehicle as a result of being parked on hospital grounds. I hereby agree to hold Gifford Medical Center, its agents and servants, blameless for any liability incurred by virtue of my vehicle being parked on their premises.

RELEASE OF PATIENT INFORMATION

YOUR AUTHORIZATION
In many situations GMC will not release patient-identifiable medical information outside this institution without your written authorization. You may revoke your authorization at any time (except the extent we have relied on it) by notifying GMC in writing.

If you do not revoke it earlier your authorization will expire one year after your last visit to GMC. By signing below, you are authorizing GMC to release medical information, which may include drug/alcohol abuse. HIV status, or psychiatric treatment, in the following situations:

INSURANCE COMPANIES
GMC will provide medical information to your insurance companies, including Worker's Compensation, if applicable, as necessary to bill for and substantiate your hospital stay and the services you received.

SUBSEQUENT MEDICAL CARE PROVIDERS
GMC will provide medical information to your physician, referring physician and other health care providers, such as rehabilitation facilities, nursing homes, visiting nurses and home health care agencies, as necessary to continue your medical care after your hospital stay.

PAYING YOUR BILLS

ASSIGNMENT OF BENEFITS
If you have health care insurance or are entitled to Worker's Compensation benefits, you agree that GMC may bill these insurers and they may make their payments directly to GMC.

NON-COVERED CHARGES
You will be billed for all GMC charges, which are not covered by your insurance.

FOR MEDICARE RECIPIENTS ONLY:
"I certify that the information given by me in applying for payment under Title XVII of the Social Security Act is correct. I authorize any holder of medical or other information about me to release it to the Social Security Administration and/or the Medicare/Medicaid Program for necessary purposes. My signature below only acknowledges the receipt of 'An Important Message From Medicare' from Gifford Medical Center on the date listed below, and does not waive any of my rights to request a review or make me liable for payment."

CHAMPUS/HAMPYA
If you are eligible for Champus benefits, you have received a copy of the "Important Message From Champus."

I have read and understood the information above and I have had the opportunity to ask questions and have them answered to my satisfaction. I agree to all of the conditions for admission to GMC described above. If I am not the patient, I certify that I am authorized by law to agree to these Conditions of Admission on the patient's behalf.

DATE

SIGNATURE OF PATIENT OR AUTHORIZATION AGENT/RELATIONSHIP IF AGENT

SIGNATURE OF WITNESS

DATE
REFERENCES


