

TESTING A MODEL OF THE DEVELOPMENT OF PTSD FOLLOWING CHILDBIRTH  
RESULTING IN ADMISSION TO THE NEONATAL INTENSIVE CARE UNIT

by

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Posttraumatic stress disorder (PTSD) can include symptoms of anxiety, mood disturbance, and behavioral difficulties following exposure to a traumatic stressor such as childbirth (American Psychiatric Association, 2013). Mothers of infants requiring specialty care in the Neonatal Intensive Care Unit (NICU) immediately after birth, are at increased risk to experience PTSD in the time following childbirth (Brandon et al., 2011). NICU mothers face unique challenges including decreased ability to participate in traditional parenting roles and worry for the health of their child, and this unique stress may interfere for adjustment following childbirth (Miles, Holditch-Davis, Schwartz, & Scher, 2007). However, recent changes to the diagnostic criteria with the American Psychiatric Association's (APA) update from the DSM-IV (APA, 2000) to the DSM-5 mean previous research has utilized diagnostic criteria that are out-of-date. Furthermore, no research exists that assesses childbirth as a traumatic stressor (PTSD Criterion A) for NICU mothers. The purpose of the current study was to test a new model of the development of PTSD symptoms specific to childbirth in a sample of NICU mothers. This model identified childbirth as a traumatic stressor in accordance with DSM-5 diagnostic criteria and examined the influence of the unique stressors associated with NICU hospitalization on the development of PTSD following childbirth.

Participants included 54 women recruited through social media who had given birth in the past one to four months whose infant was hospitalized in the NICU for at least two days. They completed an online survey assessing pregnancy and childbirth history, childbirth-specific PTSD symptoms, and stress associated with experiences in the NICU (NICU stress). Childbirth was also assessed as a potential traumatic stressor. Prior traumatic experiences and symptoms of anxiety and depression were assessed as control variables. Exploratory analyses were utilized to identify the prevalence of traumatic childbirth appraisal and PTSD. Differences in prior trauma experiences and current emotional distress were examined between mothers who appraised their childbirth as traumatic and those who did not. Moderation analyses explored the influence of NICU stress on the relationship between traumatic childbirth and PTSD symptoms while accounting for prior trauma, anxiety, and depression.

The proportion of NICU mothers reporting traumatic childbirth was 69% and the proportion scoring above the clinical cutoff for PTSD was 13%. The proportion meeting the full criteria for PTSD (reporting a traumatic childbirth and scoring above the clinical cutoff) was 20%. The moderation analysis revealed that a significant relationship between traumatic childbirth and PTSD existed for mothers who reported both traumatic childbirth experience and high NICU stress. These results provide the first estimates of the prevalence of PTSD in NICU mothers including the assessment of traumatic childbirth. Furthermore, these results identify NICU stress as a potential treatment target to decrease PTSD symptoms following NICU hospitalization.



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A Thesis

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In Partial Fulfillment of the Requirements for the Degree  
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## CHAPTER I: INTRODUCTION

Improvements in medical care have led to increased survival rates for children born preterm (before 37 completed weeks gestation), however, they continue to remain at risk to experience long-term neurocognitive difficulties and exhibit poor academic performance at school age (Lester et al., 2011; Martin, Hamilton, Osterman, Curtin, & Mathews, 2015; Wilson-Costella, Friedman, Minich, Fanaroff, & Hack, 2005). Although rates have slightly declined in recent years, over 11% of infants in the United States are born preterm (Martin et al., 2015). These children represent the majority of the 7% of newborns admitted to the neonatal intensive care unit (NICU) for specialty care each year (Osterman, Martin, Mathews, & Hamilton, 2011). As survival rates improve for infants born preterm, it is increasingly necessary to explore additional factors influencing the neurodevelopment of NICU children that serve as avenues to moderate long-term difficulties.

A factor influencing child outcomes that has been receiving attention in recent years is maternal traumatic stress. The American Psychiatric Association (APA; 2013) defines traumatic stress manifests as clinically significant symptoms of anxiety, mood disturbance, and behavioral difficulties resulting from exposure to an event in which there is a perceived threat of death or serious injury to oneself or a loved one. Post-traumatic stress disorder (PTSD) is diagnosed when traumatic stress symptomology persists for longer than one month and leads to functional difficulties (APA, 2013). Maternal PTSD following childbirth can be detrimental to maternal and child well-being by interfering with mother-infant bonding and attachment (Ayers, Eagle, & Waring, 2006; Bosquet-Enlow, Egeland, Carlson, Blood, & Wright, 2014; Elmir, Schmied, Wilkes, & Jackson, 2010; Fenech & Thomson, 2014). Maternal PTSD following childbirth has also been associated with increased length of NICU hospitalization (Johnston et al., 2012;

Melnyk, Feinstein, & Fairbanks, 2006) and poorer infant cognitive development (Parfitt, Pike, & Ayers, 2013).

The postpartum period, or the time following childbirth, is a time of adjustment for most mothers (Ayers, Wright, & Ford, 2015). The presence of childbirth-specific traumatic stress symptoms can further complicate adjustment to motherhood. While mothers whose infants do not require NICU care can experience childbirth-specific PTSD, NICU mothers, or mothers of infants hospitalized in the NICU, appear to be at increased risk to develop PTSD in the postnatal period (Beck, 2004; Brandon et al., 2011; Callahan & Hynan, 2002). NICU mothers face unique challenges including decreased ability to participate in traditional parenting roles and worry for the health of their child. During NICU hospitalization, mothers are physically separated from their infant and unable to participate in many parental activities such as holding, feeding, and changing their infant. Mothers also report significant worry for the physical health and development of their infant (Miles, Holditch-Davis, Schwartz, & Scher, 2007).

Current research has demonstrated mixed results when establishing the prevalence and characteristics of childbirth-specific PTSD in NICU mothers with prevalence estimates ranging from 15 to 40% (Lefkowitz, Baxt, & Evans, 2010; Shaw, Bernard, Storfer-Isser, Rhine, & Horwitz, 2013). Inconsistencies among studies with samples of mothers and fathers, measurement timing ranging from immediately following NICU admittance to months later, and use of assessment instruments evaluating symptoms not specific to childbirth and validated for use with outdated diagnostic criteria have contributed to this variability, and studies have often failed to identify a specific triggering event connected with postnatal traumatic stress symptoms—a necessity for establishing whether an individual meets diagnostic criteria for PTSD (McKenzie-McHarg et al., 2015). Furthermore, recent changes to the diagnostic criteria for PTSD in the

Diagnostic and Statistical Manual (DSM-5) complicate previous research on the prevalence and characteristics of childbirth-specific PTSD.

The purpose of the current research is to investigate a new model of the development of childbirth-specific PTSD in NICU mothers (Figure 1). With this model, childbirth will be evaluated as a potentially traumatic event associated with PTSD symptoms between one and three months postpartum according to DSM-5 diagnostic criteria. NICU stress, or the stress associated with having an infant hospitalized in the NICU, will be assessed as a moderator of the relationship between a traumatic childbirth and childbirth-specific PTSD symptoms while controlling for prior trauma exposure and current symptoms of emotional distress (i.e., anxiety and depression). PTSD symptoms will be assessed specifically in reference to the childbirth experience in order to better identify symptoms triggered by the experience of giving birth. This research will help clarify the prevalence of childbirth-specific PTSD in NICU mothers while describing the influence of stressors specific to this population that can serve as prevention and treatment targets.

### **Posttraumatic Stress Disorder**

According to the Diagnostic and Statistical Manual (DSM-5) of the American Psychiatric Association (APA, 2013), traumatic stress is classified as clinically significant distress or impairment in functioning following an individual's exposure to a traumatic event by directly experiencing it, witnessing it happening to others, or learning of its occurrence happening to a loved one. Diagnostic Criterion A describes a traumatic event as one resulting in actual or threatened death or serious injury. The DSM-5 specifies that this event must be deemed objectively threatening of death or injury, which is evaluated through descriptive information provided from the individual (e.g., the nature of injury sustained). The manual includes several

example events including but not limited to combat exposure and severe motor vehicle accidents. Qualifying medical events are described as those involving sudden and severe events such as anaphylactic shock. In the previous edition of the DSM, the DSM-IV-TR (APA, 2000), Criterion A included two requirements: perceived threat of death or injury (A1) and resultant feelings of extreme fear and helplessness (A2). Investigation into the predictive value of A2 yielded little support for its inclusion as a diagnostic criterion. Research found weak support for its value in predicting PTSD symptoms, and symptom experiences did not differ between those who met the A2 criterion and those who did not (Friedman, Resick, Bryant, & Brewin, 2011). Thus, changes in the DSM-5 removed the A2 requirement of an immediate and extremely negative emotional response, altering the way in which a traumatic event must be defined.

Traumatic stress symptoms fall under four general diagnostic criteria in the DSM-5: intrusion (Criterion B), avoidance (Criterion C), negative alterations in cognition and mood (Criterion D), and arousal and reactivity (Criterion E). The DSM-IV –TR listed three symptom clusters: re-experiencing, avoidant/numbing, and hyperarousal. However, the majority of factor analytic studies support the existence of the four-factor structure currently used, with previous numbing symptoms falling under Criterion D as a negative emotional response (Friedman et al., 2011). Diagnosis requires the presence of at least one intrusion symptom. Symptoms of intrusion include distressing dreams, memories, or flashbacks related to the event. It is important to note that these experiences are involuntary and the individual finds them somewhat uncontrollable and distressing. At least one persistent avoidance symptom must also be present. Avoidance symptoms can include avoiding memories, thoughts, or feelings associated with the traumatic event or actively avoiding reminders of the event. At least two symptoms of negative alterations in cognition and mood are required for diagnosis. Symptoms include inability to

remember aspects of the event, a negative emotional state such as fear or guilt, lack of interest in and withdraw from activities, social detachment, and the inability to experience positive emotions. Symptoms can also include exaggerated negative beliefs about the self, others, or the world, and distorted thoughts of self-blame. Lastly, at least two alterations in arousal and reactivity must be present manifesting as irritability and angry outbursts, reckless behavior, hypervigilance or a heightened awareness of and emotional response to potential threats, an exaggerated startle response or hyper-reactivity in response to unexpected stimuli, and concentration and sleep difficulties. Post-traumatic stress disorder refers to these symptoms persisting longer than one month (Criterion F). Finally, these symptoms must be causing significant distress and impairment in functioning (Criterion G; APA, 2013).

**Traumatic childbirth.** Although viewed as a fairly predictable and positive life experience for most women, for some, the experience of childbirth can be characterized as a traumatic event in accordance with the diagnostic criteria of either the current or previous version of the DSM (Ayers, Joseph, McKenzie-McHarg, Slade, & Wijma, 2008). Perinatal complications including poor infant health, instrumental deliveries, preeclampsia, and emergency Cesarean section (C-section) have been associated with traumatic stress symptoms following childbirth and may contribute to appraisal of the event as threatening of death or injury (Beck, 2004; Callahan & Hynan, 2002; Stramrood et al., 2011). Threat of death or injury perceived by the mother may be to herself, her infant, or both. The perceived severity of this threat may exceed estimates of medical providers, suggesting that the subjective experience of a traumatic childbirth is separate but likely complimentary to the objective threat of death or serious injury (Beck, 2004; Brandon et al., 2011).

Existing estimates either lack investigation of Criterion A altogether or are based upon the DSM-IV's diagnostic criteria. Furthermore, estimates that do exist vary greatly with some reporting prevalence of DSM-IV Criterion A1 and A2 as low as 14% and others as high as 58% (Alcorn, O'Donovan, Patrick, Creedy, & Devilly, 2010; Ayers, Harris, Sawyer, Parfitt, & Ford, 2009; Boorman, Devilly, Gamble, Creedy, & Fenwick, 2014). McKenzie-McHarg and colleagues (2015) recently put out a call for research to investigate the prevalence of traumatic childbirth using the DSM-5's Criterion A. With these diagnostic changes, the prevalence of traumatic childbirth may increase from approximately 14% with DSM-IV's Criteria A1 and A2 to almost 30% using DSM-5 Criterion A (Boorman et al., 2014). In a large, longitudinal study investigating the prevalence of traumatic childbirth and childbirth-specific PTSD, Alcorn and colleagues (2010) assessed the presence of Criterion A1 and A2 of the DSM-IV in women four to six weeks postpartum. In this sample, the percentage of women reporting a traumatic childbirth in accordance with DSM-5 Criterion A increased drastically from 54% endorsing both DSM-IV A1 and A2 to almost 84% endorsing only A1. Methodological differences may contribute to further uncertainty as to the prevalence of traumatic childbirth. Ayers and colleagues (2009) investigated postnatal PTSD in a sample of women in community and Internet samples and found that 48% of the internet sample met DSM-IV Criterion A1 and A2 while only 20% of the community sample reported the same. Although rates of traumatic childbirth increased in both samples when investigating DSM-5 Criterion A, women recruited from the Internet reported significantly higher rates of traumatic childbirth (58%) compared with women recruited from the community (36%).

**Childbirth-specific PTSD.** Childbirth-specific PTSD is operationalized in different ways. While some researchers operationalize it as traumatic childbirth combined with traumatic

stress symptoms (e.g., Ayers et al., 2015), others operationalize it as only symptoms of traumatic stress occurring in the time after childbirth (e.g., Beck, 2004). Differences in definitions contribute to further confusion when assessing PTSD in NICU mothers. Measurement tools designed to assess traumatic stress symptoms specific to the NICU also assess those relating to childbirth, thus assessing traumatic stress resulting from childbirth and/or the NICU stay (Callahan, Borja, & Hynan, 2006; Lefkowitz et al., 2010). Therefore, the prevalence of traumatic childbirth in accordance with Criterion A and childbirth-specific PTSD as experienced specifically by NICU mothers remains unknown.

Due to a lack of clearly defined and consistent operationalization, uncertainty persists as to the true prevalence of childbirth-specific PTSD. A meta-analysis by Grekin and O'Hara (2014) found the overall prevalence of PTSD (i.e., meeting a diagnostic cutoff on a clinical measure) occurring after birth to be just over 3%. When a PTSD diagnosis is not considered and instead specific symptom clusters are examined separately, as many as one in three women experience clinically significant symptoms of at least one traumatic stress criterion (Maggioni, Margola, & Fillippi, 2006). Although DSM criteria require exposure to a traumatic stressors for PTSD diagnosis, not all women who experience a traumatic childbirth will develop PTSD in the postnatal period (Ayers et al., 2015; Boorman et al., 2014). Ayers and colleagues (2015) assessed for PTSD symptoms occurring in mothers who did and did not report a traumatic childbirth as defined by Criterion A. Women who reported a traumatic childbirth experienced increased symptoms of PTSD Criterion E, reactivity and arousal, compared with those who did not report a traumatic childbirth. However, this study used the DSM-IV Criteria A1 and A2 via self-report of mothers' subjective experience to determine traumatic childbirth and did not investigate the association of other PTSD symptom groups or a full PTSD diagnosis.

Although childbirth of a healthy infant can trigger a traumatic stress response with threat of death or serious injury to the mother, the prevalence of traumatic stress is higher in NICU mothers (Brandon et al., 2011; Callahan & Hynan, 2002; Callahan et al., 2006). The majority of NICU mothers report the experience of some traumatic stress symptoms related to NICU admittance (Lefkowitz et al., 2010). Lefkowitz and colleagues (2010) examined symptoms of traumatic stress following NICU admission and found that for as many as 35% of mothers, distress levels reach those of clinically significant acute stress disorder immediately following childbirth. After 30 days, rates of clinically significant PTSD dropped to 15%. NICU mothers often report upsetting dreams or memories of the baby's hospital stay, lack of support or feeling as if no one understands the NICU experience, and difficulty remembering parts of the baby's hospital stay (Callahan et al., 2006). Because NICU mothers are more likely to develop traumatic stress symptoms, unique factors experienced by this group must exist that put them at increased risk.

**Prior trauma.** The experience of prior traumatic events can increase the likelihood of experiencing PTSD (Ozer, Best, Lipsey, & Weiss, 2003). In a systematic review, Ozer and colleagues (2003) identified prior trauma exposure as a significant predictor of PTSD and severity of PTSD symptoms. This relationship persisted regardless of time elapsed since the prior event or type of trauma (e.g., interpersonal trauma in adulthood, accidental injury). The experience of traumatic life events prior to childbirth may also increase the likelihood of a mother experiencing postnatal PTSD symptoms. In a sample of women who gave birth to healthy babies, having experienced multiple traumatic life events prior to childbirth was significantly predictive of PTSD symptoms reported at four-to-six weeks postpartum (O'Donovan et al., 2014). Prior trauma exposure has also been associated with elevated

posttraumatic stress after childbirth in NICU samples (Holditch-Davis et al., 2009). Greene and colleagues (2015) found that prior trauma exposure was significantly associated with elevated symptoms of PTSD reported shortly after childbirth and at time of the infant's hospital discharge.

### **NICU Stress and Trauma**

Estimates of the proportion of mothers experiencing persistent PTSD symptoms following a NICU stay vary greatly. Lefkowitz and colleagues (2010) reported the proportion of mothers experiencing NICU-specific PTSD symptoms at 15%, while Shaw and colleagues (2013) identified 40% of mothers as meeting criteria for PTSD not specially related to childbirth at one month postpartum. Many more NICU mothers meet criteria for clinically significant acute stress disorder in the first several days following childbirth, with rates of PTSD at 30 days postpartum dropping significantly. Mothers who report increased acute stress symptoms are significantly more likely to meet criteria for PTSD at one month postpartum (Lefkowitz et al., 2010; Shaw et al., 2013). For this group of NICU mothers in whom trauma symptoms persist, individual and NICU factors may interact to contribute to lasting difficulties.

Ehlers and Clark (2000) proposed a cognitive model of PTSD in which PTSD develops as a result of appraisal of the trauma as currently and seriously threatening. Many individuals who experience traumatic stress symptoms immediately following an event will not go on to experience PTSD. For individuals whose trauma symptoms resolve, the traumatic event no longer leads to a sense of current threat. However, individual factors (e.g., coping style, prior experiences) and characteristics of the trauma can contribute to persistent negative appraisals of the traumatic event in the form of distorted beliefs and cognitions (e.g., that the world is an unsafe place, people cannot be counted on) that maintain this sense of threat. This model has

been investigated in non-NICU mothers experiencing PTSD after childbirth. Ford, Ayers, and Bradley (2010) measured self-efficacy in coping (i.e., perceived ability to cope with negative events), posttraumatic cognitions, and PTSD symptoms three weeks and three months after giving birth to a healthy infant. Their results showed that negative appraisals of the traumatic event mediated the relationship between risk factors for emotional distress, including coping self-efficacy. Support for this theory in NICU mothers was found by Shaw and colleagues (2013) in a study of PTSD in NICU mothers in which dysfunctional coping styles was associated with elevated symptoms of PTSD one month following NICU admission. More support for a cognitive model of early trauma symptoms soon after childbirth has been found in non-NICU mothers, with less variance explained by Ehlers and Clark's model at three months postpartum (Ford et al., 2010). It is likely that at three months postpartum, most mothers have successfully resolved negative appraisals of the traumatic event through repeated exposure to their healthy child. However, NICU mothers experience unique stressors in the postpartum period that mothers of healthy infants do not (Miles, Funk, & Carlson, 1993; Miles & Holditch-Davis, 1997). These stressors may complicate adjustment to motherhood, thus preventing or slowing the resolution of negative appraisals of a traumatic childbirth.

Numerous concurrent stressors accompany parenting an infant hospitalized in the NICU. In addition to the large financial strain associated with prolonged hospitalization in an intensive care unit, medical interventions and terminology used in the NICU are unfamiliar and mothers often feel unsupported and helpless (Tahirkheli, Cherry, Tackett, McCaffree, & Gillaspay, 2014). Overall perceived stress and number of current life stressors have been associated with symptoms of general and NICU-specific PTSD in NICU mothers (Aftyka, Rybojad, Rozalska-Walaszek, Rzonca, & Humeniuk, 2014; Lefkowitz et al., 2010). However, stress specific to the

NICU experience may further contribute to PTSD. NICU stress can be detrimental to maternal and child well-being. In the initial validation study of this measure, items pertaining to the infant's appearance and behavior and those pertaining to alteration in the parental role were the strongest contributors to emotional distress (Miles et al., 1993). In a sample of NICU mothers of infants currently hospitalized, Gonya and Nelin (2013) found elevated NICU stress to interfere with visitation and participation in infant care.

Miles and colleagues (1993) created the Parental Stressor Scale: NICU (PSS: NICU) to evaluate stress levels experienced by parents of infants hospitalized in the NICU in response to environmental stressors. They determined three areas of environmental stressors contributing to parental stress: the infant's behavior and appearance, the sights and sounds of the unit, and alterations in the parental role. The PSS: NICU has been frequently utilized to evaluate parental response to the NICU environment. Elevated total scores and elevated scores on all three subscales are significantly related to symptoms of traumatic stress soon after childbirth and at time of hospital discharge (Greene et al., 2015). However, the alterations to the parental role and infant appearance and behavior subscales have demonstrated the most consistent relationships with PTSD (Holditch Davis et al., 2009).

Development of this measure was based on Magnusson's (1982) theory stating that environmental stressors can overwhelm the coping capabilities of the individual, leading to a perceived inability to appropriately cope with environmental demands. This perceived inability to cope leads to the experience of stress. Wereszczak, Miles, and Holditch-Davis (1997) developed a model of stress in NICU mothers following interviews during which participants were asked to identify factors they considered related to their experience of NICU stress. These factors included aspects of their baby's health, experiences while in the NICU identified on the

PSS: NICU, personal support, and support from NICU staff. Interestingly, participants did not report personal factors such as past experiences or individual vulnerabilities as something they considered related to their own experience of NICU stress. However, according to Magnusson's theory and the theory of stress and coping developed by Lazarus, Folkman, and colleagues, individual factors including the way in which stressors are cognitively appraised influences coping style, which in turn influences the experience of stress (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). Therefore, personal factors may influence the manner in which NICU mothers appraise and cope with their experiences in the NICU, leading to varying degrees of stress among NICU mothers.

Evidence supports the influence of cognitive appraisal and coping style as factors influencing both perceived stress and PTSD outcomes in NICU mothers. The relationship between these two outcomes is less understood. NICU mothers with more concurrent life stressors also report increased symptoms of postpartum depression, and interventions aimed at improved stress coping have been effective in decreasing maternal depression and anxiety following NICU hospitalization (Lefkowitz et al., 2010; Melnyk, Crean, Feinstein, & Faribanks, 2009). As depression and anxiety have been implicated in the relationships among stress, coping, and PTSD, better understanding of maternal emotional distress following childbirth is warranted.

### **Emotional Distress Following Childbirth**

In addition to potentially developing PTSD symptoms if she experiences a traumatic birth, women are also at increased risk to experience emotional distress in the postpartum period (Reck, Stehle, Reinig, & Mundt, 2009). Emotional distress may be particularly elevated among mothers who experience a traumatic childbirth. Supporting this supposition, Boorman and colleagues (2014) examined symptoms of emotional distress in mothers after giving birth,

including depression and anxiety. Their findings suggested that approximately half of women who identified their childbirth as a traumatic experience also reported clinically significant symptoms of emotional distress at two weeks postpartum (Boorman et al., 2014). Additionally, NICU mothers are at increased risk to experience emotional distress, with NICU mothers being twice as likely to experience anxiety and/or depression compared with mothers of healthy infants (Bener, 2013; Miles & Holditch-Davis, 1997). Indeed, nearly 50% of NICU mothers experience symptoms of anxiety and/or depression during their infant's hospitalization, and anxiety and depression often co-occur (Holditch-Davis et al., 2009; Miles et al., 2007). Although levels of distress generally decrease over time, high levels of emotional distress, particularly depression and anxiety, may contribute to increased risk of experiencing PTSD symptoms at one month postpartum and across the first year of infancy (Holditch-Davis et al., 2009).

**Depression.** According to DSM-5 diagnostic criteria, depression consists of a change in functioning occurring nearly every day for at least two weeks characterized by low mood and/or loss of interest or pleasure from previously enjoyed and important activities. Other symptoms of depression include weight and/or appetite changes, concentration or sleep difficulties, restlessness or feeling slowed down, fatigue, feelings of worthlessness or guilt, and recurrent thoughts of death or suicide (APA, 2013). Approximately 7 to 8% of women meet criteria for clinical depression in the first three months following childbirth (Reck et al., 2009). The number of women who experience elevated depressive symptoms is much higher, with approximately one in four women reporting distress on a screening measure for depression in the first eight months postpartum (Austin et al., 2010).

Maternal depression in the perinatal period has been demonstrated as a risk factor for postnatal traumatic stress symptoms in mothers of healthy infants (Cohen, Ansara, Schei,

Stuckless, & Stewart, 2004; Furuta, Sandall, & Bick, 2012; Stramrood et al., 2011). In a systematic review, Furuta and colleagues (2012) found that maternal depression during pregnancy and the early postpartum period was predictive of clinically significant traumatic stress in multiple samples of women who gave birth to healthy infants. The DSM-5 diagnostic criteria identify multiple traumatic stress symptoms leading to mood disruption through cognitive (e.g., exaggerated negative beliefs) and behavioral mechanisms (e.g., withdrawing from activities). Although there is an overlap in symptomatology, as many as 25% of mothers experiencing postnatal traumatic stress do not exhibit depressive symptoms (Czarnocka & Slade, 2000).

The prevalence of postpartum depression is even higher in NICU mothers (Brandon et al., 2011; Miles et al., 2007). For example, Lefkowitz and colleagues (2010) found that more than one in three NICU mothers screened positive for postpartum depression in the days immediately following childbirth, with 17% of NICU mothers experiencing depression one month later. Miles and colleagues (2007) found even higher rates of depression in mothers of premature infants currently hospitalized, with 63% of mothers indicating high risk for depression. Research has also demonstrated a significant association between increased depressive symptoms and symptoms of traumatic stress and NICU stress in NICU mothers (Greene et al., 2015; Lefkowitz et al., 2010; Miles et al., 2007; Shaw et al., 2013; Tahirkheli et al., 2014).

**Anxiety.** Anxiety is described as excessive and uncontrollable general worry or worry about a specific experience occurring on most days. Anxiety can manifest as restlessness, fatigue, concentration difficulties, irritability, muscle tension, and sleep problems (APA, 2013). As many as one in five mothers experience elevated anxiety in the first week postpartum and

17% of mothers continue to have elevated anxiety at one month postpartum (Dennis, Coghlan, & Vigod, 2013). Six percent of mothers meet criteria for a clinical anxiety disorder in the first three months postpartum (Reck et al., 2009). Anxiety often co-occurs with depression. Austin and colleagues (2010) found that approximately 20% of women who screened positive for postpartum depression also met criteria for a clinical anxiety disorder in the first year following childbirth. High levels of anxiety have also demonstrated strong associations with traumatic stress symptoms in the postnatal period (Stramrood et al., 2011).

Levels of postpartum anxiety are higher in NICU mothers compared with mothers of healthy infants (Bener, 2013). Greene and colleagues (2015) investigated emotional distress in a sample of NICU mothers and found that 55% reported elevated anxiety during the first month postpartum. Although anxiety improved for some women, 36% of mothers had elevated scores on a measure of anxiety at the time of their infant's hospital discharge. Postpartum anxiety has also demonstrated significant positive relationships with symptoms of traumatic stress (Holditch-Davis et al., 2009). In a study of NICU and non-NICU mothers, Kim and colleagues (2015) found significantly elevated anxiety levels in NICU mothers meeting criteria for PTSD at one month postpartum compared with NICU mothers who did not have PTSD and non-NICU mothers.

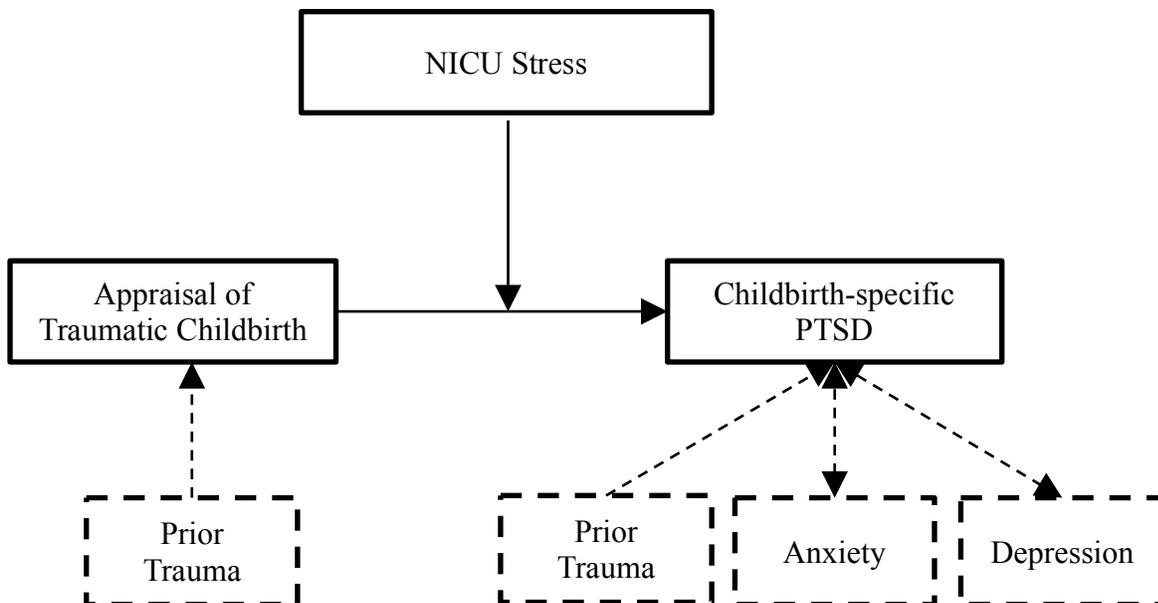
### **The Current Study**

Attempts to study traumatic childbirth have revealed mixed results in establishing the prevalence and characteristics of childbirth-specific PTSD. These discrepancies can be partially attributed to inconsistent measurements occurring months-to-years after childbirth. Although PTSD diagnostic tools are used in this research area, the establishment of a traumatic stressor in accordance with DSM Criterion A is often left out of the methodology. Indeed, no previous

research was identified that assessed Criterion A in a sample of NICU mothers. Symptom measurement is often further complicated in NICU mothers by grouping together the experience of giving birth and the experience of having a child hospitalized in the NICU, thus failing to clarify a specific trigger for PTSD symptoms. As the current literature suggests that NICU mothers are at increased risk for PTSD following childbirth, unique experiences of this population, such as interaction with the NICU environment and differences in parenting an infant hospitalized in the NICU, may be factors influencing symptomology. Clarification of NICU mothers' unique experiences as they relate to childbirth-specific PTSD and put this population at increased risk is necessary. The current study adds to the literature by assessing childbirth-specific PTSD in NICU mothers using DSM-5 diagnostic criteria including identification of childbirth as a traumatic event. Furthermore, the relationships among childbirth-specific PTSD and prior trauma, NICU stress, and depressive and anxiety symptoms were explored (Figure 1).

FIGURE 1

*A Model of Traumatic Childbirth Appraisal and PTSD in NICU Mothers*



**Specific aim 1.** The first specific aim was to describe the experience of appraisals of one's childbirth as traumatic and childbirth-specific PTSD symptoms in NICU mothers who had recently given birth. Using DSM-5 diagnostic criteria, the proportion of NICU mothers who experienced a potentially traumatic childbirth, scored above the clinical cutoff for childbirth-specific PTSD, and both experienced a traumatic childbirth and scored about the childbirth-specific PTSD clinical cutoff were explored. Relationships between traumatic childbirth and childbirth-specific PTSD and prior trauma exposure, NICU stress, and emotional distress (i.e., depression and anxiety) were explored.

*Hypothesis 1:* Based on the range of rates currently identified in the literature, at least 50% of the NICU mother sample would appraise their childbirth as traumatic (Ayers et al., 2009).

*Hypothesis 2:* Based on the current literature of PTSD in NICU mothers, approximately 15% of the NICU mother sample would score above the clinical cutoff for childbirth-specific PTSD (Lefkowitz et al., 2010).

*Hypothesis 3:* Consistent with a DSM-5 diagnosis of PTSD, NICU mothers who appraise their childbirth as traumatic would be more likely to score above the clinical cutoff for childbirth-specific PTSD (Ayers et al., 2015).

*Hypothesis 4:* NICU mothers who have a more extensive history of prior trauma would have more symptoms of childbirth-specific PTSD (e.g., Holditch-Davis et al., 2009).

*Hypothesis 5:* NICU mothers who experienced high depressive symptoms postpartum would have more childbirth-specific PTSD symptoms (e.g., Lefkowitz et al., 2010).

*Hypothesis 6:* NICU mothers who experienced high anxiety symptoms would have more childbirth-specific PTSD symptoms (e.g., Kim et al., 2015).

**Specific aim 2.** The second specific aim was to determine the influence of NICU stress on the relationship between traumatic childbirth and childbirth-specific PTSD while accounting for prior trauma, depressive and anxiety symptoms, and childbirth factors related to PTSD (i.e., infant gestational age, birth weight, and duration of NICU hospitalization).

*Hypothesis 7:* NICU stress would partially moderate the relationship between traumatic childbirth and childbirth-specific PTSD symptoms. Specifically, it was expected there would be a relationship between appraisals of one's childbirth as traumatic and PTSD symptoms when NICU stress was greater.

## CHAPTER II: METHODS

### Method

**Participants.** Women who had given birth between one and three months before study participation were recruited through advertisements on online support groups, message boards and social media groups for new mothers and mothers whose child is/was hospitalized in the NICU for a survey examining predictors of traumatic childbirth and postnatal PTSD. Inclusion criteria included the following: 1) being over the age of 18, 2) being the biological mother of a living child born between one and three months prior to study participation, 3) being a resident of the United States, and 4) able to read and complete an online survey in English.

Of the 268 women who responded to the survey, data from 87 NICU mothers were evaluated for inclusion in the current study. Eligibility criteria were expanded to include mothers who had given birth up to four months prior to participation. Only mothers whose child was hospitalized in the NICU for at least two days were considered eligible for inclusion in analysis in order to ensure mothers had an opportunity to be exposed to various NICU stressors. Of the 87 NICU mothers who participated, 25 were excluded from analysis due to the duration of time since they had given birth: seven had given birth less than 30 days prior to participation, seven had given birth more than four months prior to participation, and 11 did not report their child's birthdate. Of the remaining 62 participants, six more were excluded based on the duration of time their child was hospitalized in the NICU: three women reported their child was hospitalized for one day and three more did not include a duration of time spent in the NICU. One more participant was removed for missing over 80% of the data necessary for hypothesis testing. One more was identified as an outlier and removed for inconsistent responding, as she reported that she did not experience a potentially traumatic childbirth yet scored significantly higher on the

measure of prior trauma (score = 3), NICU stress (score = 125), and PTSD (score = 60), than the mean scores of other participants who did not report a potentially traumatic childbirth [SLESQ:  $M = .71, SD = 1.05, t(16) = 2.13, p = .05$ ; PSS: NICU:  $M = 84.00, SD = 18.39, t(16) = 2.16, p = .05$ ; PCL-5:  $M = 13.94, SD = 9.40, t(15) = 4.73, p < .001$ ]. Thus, the final dataset for analysis included 54 NICU mothers who had given birth between 30 and 116 days prior to participation ( $M = 68.00, SD = 22.63$ ) and whose infant was hospitalized in the NICU for at least two days ( $M = 31.19, SD = 25.76$ ).

Participant categorical demographics are summarized in Table 1. The majority of the sample was White and not Hispanic, with 13% identifying as a racial minority and 13% identifying as Hispanic or Latino. Three-quarters of the sample were married and only two participants reported that they were not currently living with the biological father of their baby. Participants ranged in age from 20 to 42-years-old with a mean age of 29.54 years ( $SD = 5.46$  years). Reported annual income ranged from \$2,000 to \$400,000 ( $M = 91,667, SD = 76,040$ , median = 75,000). All participants had at least a high school education, and the majority of the sample had at least an Associate's degree. Participants were given the option to select multiple options for employment status. Participants most frequently reported being employed full time. Two women reported they were currently on maternity leave and three identified as a "stay at home mother." Analysis of relationships among demographic variables revealed annual household income was significantly correlated with age such that older participants reported higher income,  $r = .39, p = .017$ . Women with a four-year college degree or higher education were older ( $M = 31.96, SD = 4.60$ ) than women with lower education (Age:  $M = 27.48, SD = 5.40$  years),  $t(48) = 3.14, p = .003$ . Women with a college degree or above also reported higher

household income ( $M = 132,950$ ,  $SD = 89,487$ ) than women with a lower education ( $M = 54,136$ ,  $SD = 30,740$ ),  $t(23.05) = 3.74$ ,  $p = .001$ . No other analyses yielded significant results.

Table 1

*Participant Demographics*

	<i>n</i>	<i>%</i>
<b>Race</b>		
White	47	87.0
African American	1	1.9
Native Hawaiian, Pacific Islander	1	1.9
Other	5	9.3
<b>Ethnicity</b>		
Hispanic or Latino	7	13.0
Not Hispanic or Latino	47	87.0
<b>Marital status</b>		
Single	1	1.9
Living with partner	10	18.5
Married	41	75.9
Separated	1	1.9
Divorced	1	1.9
Living with biological father	52	96.3
<b>Education</b>		
High school diploma, GED	7	13.0
Some college, no degree	17	31.5
Associate's degree	5	9.3
Bachelor's degree	17	31.5
Graduate or professional degree	8	14.8
<b>Employment status</b>		
Employed full-time	23	42.6
Employed part-time	6	11.1
Not currently employed, looking for work	4	7.4
Not currently employed, not looking for work	17	31.5
Full-time student	3	5.6
Unable to work, on disability	1	1.9
Other	6	11.1

**Procedure.** Participants completed a single online survey from a computer when they were able. Women were made aware of the study through advertisements posted to online support groups, message boards and social media groups for new mothers and mothers whose child is/was hospitalized in the NICU (Appendix A). Potential participants self-identified as

interested and eligible for the study. The informed consent process began when potential participants accessed the online survey administered through Qualtrics. Potential participants read a brief description of the study, the eligibility requirements, and the estimated length of participation (Appendix B). Women who indicated their interest in participating were presented with a consent form including a brief explanation of the study purpose and the requirements of participation. Women were then given the option to complete the survey or exit. Only those indicating their desire to continue with the study were administered the survey. Although no participants contacted the investigator during the study, they were provided with the researcher's phone number and email address to contact with any questions or concerns regarding the study. The East Carolina University Institutional Review Board approved the study prior to participant enrollment (see Appendix C).

**Measures.** Information assessing participant demographics, pregnancy and childbirth history, appraisal of a traumatic childbirth, childbirth-specific PTSD symptoms, NICU stress, trauma history, and depressive and anxiety symptoms were collected via a survey administered through Qualtrics (Appendix D). Participants were asked to complete the survey with respect to only their most recent childbirth experience.

*Demographics.* The first component of the survey collected demographic information about the mother including the following: age, race, ethnicity, marital status, highest level of education, employment status, number of adults and children living in the home, and estimated annual household income.

*Pregnancy and childbirth history.* The second component assessed pregnancy and childbirth history. Mothers were asked to report their gravidity and parity, and if they had a previous biological child hospitalized in the NICU. With respect to only their most recent

pregnancy, mothers were asked if they had a singleton or multiple pregnancy. Women who had a multiple pregnancy were asked to complete the survey with respect to only one of their babies. They were then asked to report the infant's birth date, gestational age at birth, birth weight, mode of delivery (i.e., vaginal, instrumental vaginal, planned C-section, or unplanned or emergency C-section) and delivery location (i.e., home, hospital, or birthing center). Mothers were also asked to complete a checklist of pregnancy and birth complications developed by Stramrood and colleagues (2011) with respect to only their most recent pregnancy and birth. Pregnancy complications included: hypertension, pre-eclampsia and/or HELLP (hemolysis, elevated liver enzymes, and low platelet count) syndrome, antenatal blood loss, congenital defects, preterm premature rupture of membranes (PPROM), and membranes ruptured for longer than 24 hours. Birth complications included: postpartum hemorrhage, manual placenta removal, maternal vaginal suturing, maternal ICU admittance, meconium, asphyxia, and neonatal infection requiring antibiotics. Participants were also given the option to write in additional pregnancy and birth complications they experienced. Additionally, participants were asked if their child was or is currently hospitalized in the NICU and if they knew their baby would need NICU admittance prior to childbirth.

*Traumatic childbirth.* Participants answered two questions to identify their appraisal of their most recent childbirth as a traumatic stressor in accordance with criterion A in the DSM-5. This methodology for identifying appraisal of one's childbirth as traumatic was employed by Ayers and colleagues (2015) in a sample of NICU mothers. Participants were asked if they thought their or someone else's life was in danger or they or someone else would be physically injured and if they felt terrified or helpless. In accordance with DSM-IV criteria, mothers who responded positively to both of these questions were identified as having a traumatic childbirth.

These mothers scored significantly higher on a measure of PTSD symptoms of hyperarousal. For the current study, this methodology was updated to reflect DSM-5 criteria. Women were first asked if they believed their life was in danger or they were threatened with physical injury during the childbirth. They were then asked if they believed their child's life was in danger or their child was threatened with physical injury during the childbirth. Participants who responded "yes" to at least one of these items were identified as appraising their childbirth as traumatic.

*Childbirth-specific PTSD symptoms.* Participants were prompted to answer questions assessing PTSD symptoms in the past month with respect to their most recent childbirth experience using the PTSD Checklist for DSM-5 (PCL-5; Weathers et al., 2013). The PCL-5 consists of 20 items corresponding to the four clusters of diagnostic criteria for PTSD in the DSM-5: cluster B – intrusion, cluster C – avoidance, cluster D – alterations in cognitions and mood, and cluster E – alterations in arousal and reactivity. Individual items were modified to specify that the participant should respond while keeping in mind their most recent experience giving birth in order to measure PTSD symptoms specifically associated with childbirth. For items that included the term "the stressful experience," this was replaced with "giving birth." Five items correspond to cluster B symptoms (e.g., repeated, disturbing dreams of giving birth), two items correspond to cluster C symptoms (e.g., avoiding memories, thoughts, or feelings related to giving birth), seven items correspond to cluster D symptoms (e.g., loss of interest in activities that you used to enjoy), and six items correspond to cluster E symptoms (e.g., feeling jumpy or easily startled). Participants rated how much they were bothered by each symptom in the past month on a 5-point scale with ratings of 0 (*not at all*), 1 (*a little bit*), 2 (*moderately*), 3 (*quite a bit*), and 4 (*extremely*). A total score was calculated by summing all items, with possible scores ranging from 0 to 80, and scores above 38 being considered indicative of clinically

significant PTSD (Weathers et al., 2013). Total cluster scores were also calculated by summing items within each cluster. In addition, in order to compare scores across clusters given varying number of items, the mean total cluster score was divided by the number of items in the cluster. The PCL-5 has demonstrated strong test-retest reliability ( $r = .82$ ) and internal consistency ( $\alpha_s = .91-.94$ ), convergent validity ( $r_s = .74-.94$ ) with college student and military samples (Blevins, Weathers, Davis, Witte, & Domino, 2015; Wortmann et al., 2016). Cronbach's alpha for the total score in the current study was .95 with cluster alphas ranging from .84 to .92.

*Trauma history.* Exposure to past traumatic events was assessed using the Stressful Life Events Screening Questionnaire (SLESQ; Goodman, Corcoran, Turner, Yuan, & Green, 1998). Participants were asked to report whether or not they experienced any of 13 potentially traumatic life events. These events included surviving life-threatening illness or accident, mugging or robbery, rape or other sexual assault, physical abuse in childhood and adulthood, verbal emotional abuse, threat with a weapon, and any other situation in which there was a serious threat to life or of injury (e.g., military combat). The SLESQ also assessed for exposure to threat of life or serious injury to others including death of an important other by accident, homicide, or suicide and directly witnessing the death of another individual, including miscarriage. Where relevant (e.g., other serious threat of life or serious injury), participants were asked not to include their most recent childbirth. In order to assess fit with Criterion A1 of the DSM-IV, participants who indicated exposure to an event were asked for additional descriptive information (e.g., age of exposure and level of force involved). If a participant did not respond to these additional items, the event lacking descriptive information was not coded as a prior trauma experience in accordance with scoring protocol developed by the original authors. Using this decision rule, one positive response to item seven ("When you were a child, did a parent, caregiver or other person

ever slap you repeatedly, beat you, or otherwise attack or harm you”) and four responses to item nine (“Has a parent, romantic partner, or family member repeatedly ridiculed you, put you down, ignored you, or told you that you were no good”) were removed. In the original psychometric evaluation in a sample of male and female college students, the SLESQ demonstrated adequate overall test-retest reliability with a median kappa of .73, convergent validity with a trauma interview ( $r = .77$ ), and specificity for identifying traumatic events meeting DSM-IV Criterion A1 of PTSD diagnostics (Goodman et al., 1998).

*Depressive symptoms.* Depressive symptoms were measured using the Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987). The EPDS is a ten-item self-report depression screening measure assessing symptoms of depression occurring within the past week (e.g., “I have felt sad or miserable” and “things have been getting on top of me”). Participants respond to each item on a 4-point scale (0 to 3) for a total score ranging from 0 to 30 with higher scores reflecting increased severity of depressive symptoms. Although varying cutoff scores can be used, a cutoff score of 13 or above used to identify women at risk for postpartum depression demonstrated a sensitivity of 86% and a specificity of 78% in the original validation study sample of women six weeks after birth. The EPDS also demonstrated good reliability with Cronbach’s alpha of .87 (Cox et al., 1987). The EPDS is the most commonly used measure of depressive symptoms in the postpartum period, particularly because it does not include somatic symptoms of depression that may overlap with physical strain related to the postpartum period (e.g., fatigue; Sit & Wisner, 2009). Cronbach’s alpha in the current study was .91.

*Anxiety symptoms.* Anxiety symptoms was measured with the anxiety subscale from the Hospital Anxiety and Depression Scale (HADS-A; Zigmond & Snaith, 1983). The HADS-A

includes seven items assessing the presence or absence of various symptoms of anxiety (e.g., “I feel tense and wound up” and “worrying thoughts go through my mind”) during the previous week. Participants respond to each item on a 4-point scale (0 to 3) for a total score ranging from 0 to 21 with higher scores reflecting increased severity of anxiety symptoms. A review of the validity of the HADS conducted by Bjelland, Dahl, Haug, and Neckelmann (2002) indicated that a cutoff of 8 on the HADS-A subscale should be used for optimal sensitivity for identifying problems with anxiety. The HADS-A also demonstrated good reliability with Cronbach’s alpha ranging from .68 to .93 with a mean value of .83 among articles reviewed. As the HADS was developed for use in medical populations, common somatic symptoms of anxiety are not assessed to avoid overlap with somatic effects of physical health changes. As the postpartum period is characterized by bodily changes following childbirth, the HADS-A was chosen as an appropriate measure of the cognitive and emotional symptoms of anxiety. A systematic review of perinatal mental health screening tools revealed the HADS-A demonstrated high sensitivity and specificity for anxiety disorders during pregnancy (Meades & Ayers, 2011). Cronbach’s alpha in the current study was .88.

*NICU stress.* Level of stress associated with having an infant hospitalized in the NICU was measured with the Parental Stressor Scale: NICU (PSS: NICU; Miles et al., 1993). The PSS: NICU consists of 26 items in three domains: sights and sounds of the NICU, infant appearance and behavior, and parental role alteration. Participants were asked to rate how stressful each experience had been for them on a scale of 1 (*not at all stressful*), 2 (*a little stressful*), 3 (*moderately stressful*), 4 (*very stressful*), 5 (*extremely stressful*), or not applicable (*did not experience this item*). Five items assessed stress associated with the sights and sounds of the unit (e.g., the presence of monitors and equipment), 14 items assessed stress associated

with infant appearance and behavior (e.g., my baby's unusual or abnormal breathing patterns), and seven items assessed stress associated with parental role alteration (e.g., being separated from my baby). A total score was obtained for each domain and the full measure, with items marked "NA" receiving a score of 0. In order to compare scores across domains with differing numbers of items, the mean of each total subscale score was divided by the number of items within that domain. The three-factor structure demonstrated adequate internal consistency with Cronbach's alpha coefficients above .80 for all domains and .94 for the full measure in the original validation sample of parents (mothers and fathers) of infants currently hospitalized in the NICU (Miles et al., 1993). A more recent factor analysis revealed that the sights and sounds of the Unit subscale could be combined with the baby's appearance and behavior subscale while the parental role alteration subscale remains a separate factor with Cronbach's alpha of .92 for both subscales (Miles et al., 2007). For the current study, the three-factor structure was maintained in order to provide more detailed information regarding specific types of stressors.

**Alarm protocol.** Through survey responses, some participants indicated they were experiencing elevated levels of distress. For participant safety, all participants were provided with contact information for several national organizations through Qualtrics, including The Postpartum Stress Center (<http://postpartumstress.com/>), Postpartum Support International (<http://www.postpartum.net/>), Hand to Hold (<http://handtohold.org/>), National Center for PTSD (<http://www.ptsd.va.gov/>), Rape, Abuse, and Incest National Network (<https://rainn.org/>), and National Suicide Prevention Lifeline (1-800-273-TALK, <http://www.suicidepreventionlifeline.org>; Appendix E). Participants who endorsed suicidal thoughts on the EPDS (i.e., responded "hardly ever," "sometimes," or "yes, quite often" to the survey item "the thought of harming myself has occurred to me") were provided with an

alternative message through Qualtrics including the aforementioned resources and emphasizing the importance of contacting the National Suicide Prevention Lifeline in case of a crisis (Appendix F).

### **Data Analysis**

SPSS was used for all data analyses. Descriptive statistics for all variables were conducted with means, standard deviations, and ranges for continuous variables and frequencies and percentages for categorical variables. Before analyses were completed, skewness and kurtosis was examined for continuous variables including: SLESQ, PSS: NICU, PCL-5, HADS-A, and EPDS. Relationships among and between all demographic, pregnancy, and childbirth variables and stress and emotional distress measures were explored. For these exploratory analyses, maternal race was dichotomized into White ( $n = 47$ ) and minority ( $n = 7$ ) groups, marital status was dichotomized into married ( $n = 40$ ) and other ( $n = 13$ ) groups, and education was dichotomized into four-year degree or higher ( $n = 25$ ) and other ( $n = 29$ ) groups.

The first specific aim was to describe the experience of appraisals of one's childbirth as traumatic and childbirth-specific PTSD symptoms in NICU mothers who had recently given birth. To test hypotheses 1 and 2, descriptive statistics were conducted, with frequencies and percentages of participants who appraised their childbirth as traumatic and scored above the clinical cutoff for PTSD on the PCL-5. Based on the rate of traumatic childbirth identified in the existing literature (Ayers et al., 2009), it was expected that at least 50% of the NICU mother sample would appraise their childbirth as traumatic (hypothesis 1). Based on the rate of postnatal PTSD identified in the existing literature (Lefkowitz et al., 2010), it was expected that approximately 15% of the NICU mother sample would score above the clinical cutoff for childbirth-specific PTSD symptoms (hypothesis 2). Hypothesis 3 proposed that mothers who

appraised their childbirth as traumatic would be more likely to meet the clinical cutoff for childbirth-specific PTSD symptoms (Ayers et al., 2015). To test this hypothesis, a chi square analysis was performed examining the dichotomous variables of report of a traumatic childbirth and meeting the clinical cutoff for PTSD on the PCL-5. Exploratory analyses were performed evaluating relationship of traumatic childbirth and PTSD score with demographic, pregnancy, and childbirth characteristics. Additional analyses were performed to explore differences in stress and emotional distress measures between traumatic childbirth groups (mothers who appraised childbirth as traumatic and those who did not) and PTSD groups (mothers who met the clinical cutoff for PTSD on the PCL-5 and those who did not).

It was also hypothesized that NICU mothers who experienced prior trauma and high emotional distress would have greater symptoms of childbirth-PTSD. To test these hypotheses, correlation analyses were performed between the continuous variable of childbirth-specific PTSD symptoms and the continuous variables of cumulative prior trauma report on the SLESQ (hypothesis 4), depressive symptoms as measured by total score on the EPDS (hypothesis 5), and anxiety symptoms as measured by total score on the HADS-A (hypothesis 6).

The second specific aim was to determine the influence of NICU stress on the relationship between appraisals of a traumatic childbirth and childbirth-specific PTSD symptoms while accounting for prior trauma, postpartum depressive and anxiety symptoms, and pregnancy and childbirth characteristics, as needed. It was hypothesized that NICU stress as measured by total score on the PSS: NICU would moderate the relationship between appraising one's childbirth as traumatic and childbirth-specific PTSD as measured by the PCL-5 (hypothesis 8). Specifically, it was expected that there would be a relationship between traumatic childbirth appraisals and PTSD symptoms when NICU stress was greater. To test this hypothesis,

moderation analysis was performed using Hayes' Process Model, a macro computational tool for path analysis in SPSS (Hayes, 2013). The interaction was then probed to evaluate the relationship between the predictor variable (traumatic childbirth appraisal) and the outcome (PTSD symptoms) at standardized low, medium, and high levels of the moderator (NICU stress).

The analysis of the first specific aim was used to calculate an estimated sample size using GPower 3.2 (Faul, Erdfelder, Buchner, & Lang, 2009). The chi-square analysis used to test hypothesis 3 required the largest sample size to achieve adequate power. To ensure there was an 80% chance of detecting a medium effect size ( $d = .5$ ;  $\alpha = .05$ ) in the chi-square analyses, a minimum sample size of 108 was calculated. GPower was also used to calculate the achieved power with the recruited sample size of 54 participants. For the chi-square analysis used to test hypothesis 3, a power of 60% was achieved.

## CHAPTER III: RESULTS

### Descriptive Statistics

**Pregnancy and childbirth characteristics.** Pregnancy and childbirth categorical characteristics are summarized in Table 2. The majority of participants reported at least one prior pregnancy and were primiparous. The majority of the sample had a singleton pregnancy (87%) and reported at least one pregnancy complication (82%), with PPRM as the most commonly reported complication and hypertension as the second most commonly reported complication. In addition to the specific complications listed in the survey, four participants reported placental abruption, three reported oligohydramnios (low amniotic fluid), and three reported premature labor. All participants reported that they gave birth in the hospital and half reported that they had an unplanned or emergency C-section.

The majority of participants reported at least once childbirth complication (65%), with neonatal infection requiring antibiotics and manual placenta removal being the most commonly reported complications. Time since childbirth ranged from 30 days to 116 days with an average of 68 days since giving birth ( $SD = 22.63$  days). Similar to patterns seen with participant demographics, the majority of participants reported their infant's race as White ( $n = 44, 82\%$ ) and ethnicity as not Hispanic or Latino ( $n = 47, 87\%$ ). The majority of participants reported they gave birth to a male infant ( $n = 32, 59\%$ ). Gestational age at birth ranged from 22 to 42 completed weeks ( $M = 33.32, SD = 5.73$  weeks), with 63% of participants reporting their child was born preterm (before 37 completed weeks gestation). Reported birth weight ranged from 1.06 to 10.56 pounds ( $M = 4.78, SD = 2.71$  pounds). Five participants reported having an older child previously hospitalized in the NICU, and nearly half of the sample reported having prior knowledge that their infant would need NICU admittance. The duration of time hospitalized in

the NICU ranged from two to 98 days ( $M = 31.19$ ,  $SD = 25.76$  days), and just over one third of the sample reported their infant was currently hospitalized in the NICU at the time of participation.

Table 2

*Pregnancy and Childbirth Characteristics*

	<i>n</i>	<i>%</i>
Gravidity		
First pregnancy	24	44.4
Second pregnancy	17	31.5
Third or more	12	22.2
Parity		
One	33	61.1
Two	18	33.3
Three	3	5.6
Pregnancy complications		
Hypertension	11	20.4
Pre-eclampsia and/or HELLP syndrome	5	9.3
Blood loss during pregnancy	6	11.1
PPROM (before 37 weeks)	16	29.6
Membranes ruptured for over 24 hours	10	18.5
Congenital defects	5	9.3
Other	19	35.2
Multiple pregnancy	7	13.0
Mode of delivery		
Vaginal	21	38.9
Instrumental vaginal	3	5.6
Planned C-section	3	5.6
Unplanned or emergency C-section	27	50.0
Childbirth complications		
Postpartum hemorrhage	6	11.1
Manual placental removal	11	20.4
Vaginal suturing	9	16.7
Maternal ICU admittance	1	1.9
Meconium in the fluid	6	11.1
Neonatal asphyxia	9	16.7
Neonatal infection	15	27.8
Other	2	3.7
Older children admitted to NICU	5	9.3
Prior knowledge of NICU admittance	25	46.3
Baby currently in NICU	19	35.2

The experience of more pregnancy complications was correlated with lower infant gestational age at birth ( $r = -.36, p = .007$ ), birth weight ( $r = -.50, p < .001$ ), and longer time in the NICU ( $r = .27, p = .05$ ). Longer time in the NICU was also correlated with lower gestational age ( $r = -.77, p < .001$ ) and birth weight ( $r = -.88, p < .001$ ). Mothers who identified as a minority race experienced significantly more pregnancy complications ( $M = 2.00, SD = 1.15$ ) than those who identified as White ( $M = 1.23, SD = .87$ ),  $t(52) = 2.09, p = .04$ . Analysis of all other relationships among demographic, pregnancy and childbirth characteristics did not yield significant relationships.

**Prior trauma, stress, and emotional distress.** Descriptive statistics of the prior trauma, NICU stress, and emotional distress variables (PTSD, depressive, and anxiety symptoms) are summarized in Table 3. As the absolute value of skewness and kurtosis values did not exceed 2.0 for any total measure score, no data transformation was necessary.

*Prior trauma experience.* Forty percent of participants ( $n = 21$ ) reported experiencing at least one prior traumatic event on the SLESQ. Examination of individual items revealed that all items were endorsed by at least two participants. The most commonly reported experiences were sudden death of a loved one ( $n = 11$ ), sexual assault ( $n = 10$ ), physical abuse in childhood ( $n = 10$ ), physical abuse in adulthood ( $n = 8$ ), and verbal abuse ( $n = 9$ ). Total number of reported prior traumatic events experienced was significantly correlated with infant birth weight ( $r = -.31, p = .03$ ), infant gestational age at birth ( $r = -.33, p = .02$ ), and duration of NICU hospitalization ( $r = .29, p = .04$ ). Women who had at least a four-year college degree reported significantly fewer prior traumatic events ( $M = 0.83, SD = 1.11$ ) than those with a lower education ( $M = 1.83, SD = 1.73$ ),  $t(48.14) = 2.52, p = .015$ . Mothers who identified as White reported significantly fewer

prior traumatic experiences ( $M = 1.15$ ,  $SD = 1.32$ ) than mothers who identified as a minority race ( $M = 3.12$ ,  $SD = 2.23$ ),  $t(50) = 3.24$ ,  $p = .002$ .

*NICU stress.* All participants reported some stress on the PSS: NICU. To compare subscales with differing numbers of items, the mean of each summed subscale score was divided by the number of items within that subscale. This examination indicated participants most often reported stress related to parental role alteration (3.76), followed by baby's appearance and behavior in the NICU (2.54), and the sights and sounds of the unit (2.41). Higher total stress scores were also related to lower birth weight ( $r = -.36$ ,  $p < .001$ ), lower gestational age ( $r = -.44$ ,  $p < .001$ ), and longer time spent in the NICU ( $r = .54$ ,  $p < .001$ ). Higher scores on the baby's appearance and behavior in the NICU subscale were also related to lower birth weight ( $r = -.49$ ,  $p < .001$ ), lower gestational age ( $r = -.55$ ,  $p < .001$ ), and longer time hospitalized in the NICU ( $r = .61$ ,  $p < .001$ ). Women who had at least a four-year college degree reported significantly more stress related to the sights and sounds of the NICU ( $M = 13.28$ ,  $SD = 4.00$ ) than those with a lower education ( $M = 11.00$ ,  $SD = 3.55$ ),  $t(52) = -2.22$ ,  $p = .031$ .

*Childbirth-specific PTSD symptoms.* Seven participants (13%) scored above the clinical cutoff (38) on the PCL-5. The mean summed cluster scores for each PCL-5 symptom cluster are reported in Table 3. As each cluster is represented by a different number of items, symptom clusters were compared by dividing the mean summed cluster score by the number of items in that cluster. This examination revealed that participants reported the most symptoms related to clusters D (1.05) and E (1.07), followed by cluster B (0.80), with cluster C symptoms (0.69) reported least often. Those with higher PCL-5 scores were more likely to have babies born at earlier gestational age ( $r = -.30$ ,  $p = .03$ ) and lower birth weight ( $r = -.28$ ,  $p = .05$ ), and PCL-5 score was also positively correlated with the number of days hospitalized in the NICU ( $r = .29$ ,  $p$

= .04). A high score on cluster C (avoidance symptoms) was related to lower birth weight ( $r = -.29, p = .04$ ) while score on cluster D (symptoms of alterations in cognition and mood) was marginally correlated with earlier gestational age at birth ( $r = .27, p = .05$ ).

Table 3

*Descriptive Statistics of Prior Trauma, Stress, and Emotional Distress Variables*

	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Max	Skewness	Kurtosis
Prior trauma (SLESQ)	52	1.38	1.56	0	7	1.19	1.60
NICU stress (PSS:NICU)	54	73.94	21.17	32	115	0.01	-0.75
Sights and sounds	54	12.06	3.90	5	21	0.46	-0.26
Baby's appearance and behavior	54	35.57	14.76	7	66	0.30	-0.49
Parental role alteration	54	26.31	7.19	6	35	-0.79	-0.02
PTSD symptoms (PCL-5)	52	18.48	16.27	0	68	1.15	1.09
Cluster B: Intrusion	53	3.19	4.60	0	20	1.92	3.68
Cluster C: Avoidance	53	1.38	2.00	0	6	1.31	0.32
Cluster D: Alterations in cognition and mood	53	7.36	6.30	0	24	0.91	0.20
Cluster E: Alterations in arousal and reactivity	52	6.44	5.60	0	22	0.78	-0.13
Anxiety symptoms (HADS-A)	53	7.02	4.66	0	17	0.35	-0.91
Depressive symptoms (EPDS)	53	9.28	6.21	0	24	0.56	-0.44

*Note.* PSS: NICU: Parental Stressor Scale NICU. PCL-5: PTSD Checklist for DSM-5. SLESQ: Stressful Life Events Screening Questionnaire. EPDS: Edinburgh Postnatal Depression Scale; HADS-A: Hospital Anxiety and Depression Scale – Anxiety subscale.

*Anxiety symptoms.* Twenty-four participants (44%) scored above the clinical cutoff (8) on the HADS-A measure of anxiety symptoms. The experience of more childbirth complications was correlated with HADS-A score ( $r = .28, p = .04$ ). HADS-A score was also correlated with lower birth weight ( $r = -.30, p = .05$ ), lower gestational age at birth ( $r = -.33, p = .02$ ), and longer time hospitalized in the NICU ( $r = .30, p = .03$ ).

*Depressive symptoms.* Sixteen participants (31%) screened positively for depression by scoring above the clinical cutoff (13) on the EPDS measure of depressive symptoms. The majority of participants denied experiencing suicidal ideation (i.e., selected “never”) in the week

prior to study participation (82%) while the remaining 18% reported experiencing suicidal ideation “sometimes” ( $n = 4$ ) or “hardly ever” ( $n = 6$ ). Women who screened positively for depression were significantly more likely to screen positively for anxiety, with 15 participants scoring above the cutoff on both the EPDS and HADS-A,  $\chi^2(1) = 21.07, p < .001$ . Total EPDS score was significantly correlated with lower gestational age at birth ( $r = -.30, p = .03$ ) and longer time hospitalized in the NICU ( $r = .32, p = .02$ ).

### **Aim 1: Description of the Experience of Traumatic Childbirth**

The first specific aim was to describe the frequency of appraisals of childbirth as traumatic and childbirth-specific PTSD symptoms and to explore relationships among traumatic childbirth appraisals, childbirth-specific PTSD, and emotional distress. It was hypothesized that at least 50% of the sample would appraise their childbirth as traumatic in accordance with Criterion A of the DSM-5 (hypothesis 1). Thirty-seven participants (69%) reported experiencing a traumatic childbirth. All of these women reported fear for their baby’s life or serious injury to their baby during childbirth, and 12 of these participants reported additional fear for their own life or that they would be seriously injured during childbirth (22%). Women who reported traumatic childbirth appraisals were significantly more likely to have experienced at least one pregnancy complication (75%) than those who did not report traumatic childbirth (25%),  $\chi^2(1) = 4.63, p = .03$ . Women who reported traumatic childbirth were significantly more likely to have given birth through an unplanned or emergency C-section (82%) than those who did not (19%),  $\chi^2(3) = 11.27, p = .01$ . These participants also gave birth to infants at a lower birth weight ( $M = 4.02, SD = 2.50$ ) than women who did not report traumatic childbirth ( $M = 6.37, SD = 2.50$ ),  $t(41) = 3.20, p = .002$ . Women who reported traumatic childbirth also gave birth to infants at a younger gestational age ( $M = 31.84, SD = 5.85$ ) than those who did not report traumatic

childbirth ( $M = 36.53$ ,  $SD = 3.97$ ),  $t(44.24) = 3.45$ ,  $p = .001$ , and they had significantly longer NICU hospitalization ( $M = 36.30$ ,  $SD = 27.50$ ) than those who did not report traumatic childbirth ( $M = 20.06$ ,  $SD = 17.45$ ),  $t(46.47) = 2.62$ ,  $p = .01$ .

Table 4

*Prior Trauma, Stress, and Emotional Distress Comparisons of Women Reporting a Traumatic Childbirth*

	Traumatic Childbirth ( $n = 37$ )		Non-traumatic Childbirth ( $n = 17$ )		$t$	$df$	$p$	Cohen's $d$
	$M$	$SD$	$M$	$SD$				
Prior trauma	1.74	1.67	.65	1.00	2.95	47.67	.005	0.74
Depressive symptoms	9.00	6.36	9.94	5.99	0.50	51	.619	-0.02
Anxiety symptoms	7.16	4.81	6.69	4.44	0.34	51	.737	0.10
PTSD symptoms	20.69	18.42	13.94	9.47	1.74	49.76	.087	0.42
B: Intrusion	3.97	5.14	1.53	2.60	2.30	50.67	.026	0.55
C: Avoidance	1.78	2.22	.53	1.07	2.77	50.94	.008	0.66
D: Alterations in cognition and mood	7.75	6.81	6.53	5.11	0.66	51	.515	0.20
E: Alterations in arousal and reactivity	6.97	6.29	5.35	3.72	1.16	47.84	.252	0.29
NICU stress	78.54	21.83	63.94	16.01	2.46	52	.017	0.76
Sights and sounds	12.62	4.13	10.82	3.11	1.60	52	.116	0.48
Baby's appearance and behavior	38.38	15.94	29.47	9.61	2.54	47.95	.014	0.73
Parental role alteration	27.54	6.71	23.65	7.69	1.89	52	.064	0.54

Differences between mothers who did not report a traumatic childbirth, those who reported fear for their baby's life or that their baby would be seriously injured, and those who reported additional fear for their own life or that they would be injured were also examined. ANOVA was employed to examine differences in number of pregnancy and birth complications experiences. Although no significant differences existed in pregnancy complications, the

ANOVA revealed significantly different number of birth complications between groups,  $F(2,53) = 5.94, p = .005$ . Due to violation of the homogeneity of variance assumption, Games-Howell post hoc test was employed to examine differences between groups. Post hoc analysis revealed that women reporting fear for their own life or that they would be seriously injured reported more birth complications ( $M = 1.92$ ) than women who reported fear for their baby's life or that their baby would be seriously injured only ( $M = 1.00$ ),  $p = .004$ , and those who did not report traumatic childbirth ( $M = 0.76$ ),  $p = .04$ . No other analyses were significant, including those evaluating potential differences in demographics, pregnancy factors, or childbirth characteristics.

Differences between scores on measures of prior trauma, NICU stress, and depressive and anxiety symptoms were examined between traumatic childbirth groups (women who reported traumatic childbirth and those who did not). Results of mean comparisons are summarized in Table 4. Women who reported a traumatic childbirth also reported experiencing significantly more prior traumatic events with a medium-sized effect ( $.5 \leq \text{Cohen's } d \leq .8$ ). An ANOVA revealed that SLESQ scores differed among mothers who did not report a traumatic childbirth, those who reported only fear for their baby's life or serious injury to their baby, and those who reported additional fear for their own life or injury to the self,  $F(2,51) = 4.21, p = .02$ . Tukey's honestly significant differences post hoc test was employed to compare differences between groups. Analysis revealed that women who reported additional fear for their own life or injury to the self, scored significantly higher on the SLESQ ( $M = 2.27$ ) than women who did not report a traumatic childbirth ( $M = 0.65$ ),  $p = .02$ . No other analyses of emotional distress measures revealed significant differences.

Difference on PCL-5 score between groups approached significance, with mothers reporting a traumatic childbirth scoring higher. Women who reported a traumatic childbirth

reported significantly more symptoms of intrusion (cluster B) and avoidance (cluster C) on this measure. Participants who reported a traumatic childbirth also scored significantly higher on the PSS: NICU with a moderate effect. More specifically, these women reported significantly more stress related to the baby's appearance and behavior. Mothers reporting a traumatic childbirth reported more stress on the other subscales (sights and sounds of the unit and parental role alteration), and this difference approached significance on the parental role alterations subscale.

Chi-square analysis comparing report of a traumatic childbirth and scoring above the clinical cutoff on the EPDS revealed 30% of women who reported a traumatic childbirth also screened positively for depression, but these women were no more likely to screen positively than those who did not appraise their childbirth as traumatic (38%),  $\chi^2(1) = .31, p = .58$ . Similarly, the 43% of women who reported a traumatic childbirth were not significantly more likely to screen positively for anxiety than those who did not appraise their childbirth as traumatic (50%),  $\chi^2(1) = .21, p = .65$ .

It was hypothesized that at least 15% of the sample would score above the clinical cutoff for PTSD on the PCL-5 (hypothesis 2) and that mothers who reported traumatic childbirth would be more likely to score above the clinical cutoff on the PCL-5 than mothers who did not report traumatic childbirth (hypothesis 3). Chi-square analysis revealed that 13% of the total sample scored about the clinical cutoff on the PCL-5 ( $n = 7$ ). Women who reported a traumatic childbirth were significantly more likely to score above the clinical cutoff on the PCL-5 (20%) than those who did not appraise their childbirth as traumatic, with all seven participants who scored above the clinical cutoff on the PCL-5 reporting a traumatic childbirth,  $\chi^2(1) = 3.93, p = .05$ .

Table 5

*Prior Trauma, Stress, and Emotional Distress Comparisons of Women who Screened Positive for PTSD*

	Positive PTSD Screen ( <i>n</i> = 7)		Negative PTSD Screen ( <i>n</i> = 45)		<i>t</i>	<i>df</i>	<i>p</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
Prior trauma	2.67	1.03	1.23	1.03	2.15	48	.036	1.43
Depressive symptoms	19.14	3.53	7.80	5.17	5.58	50	<.001	2.31
Anxiety symptoms	14.43	2.00	6.02	3.87	8.83	14.69	<.001	2.32
PTSD symptoms	48.57	12.42	13.80	10.92	7.71	50	<.001	3.19
B: Intrusion	11.14	6.80	2.00	2.67	3.52	6.29	.012	2.71
C: Avoidance	5.43	0.79	0.78	1.28	9.32	50	<.001	3.85
D: Alterations in cognition and mood	16.71	6.87	5.96	4.93	5.09	50	<.001	2.11
E: Alterations in arousal and reactivity	15.29	3.99	5.07	4.44	5.73	50	<.001	2.37
NICU stress	103.29	6.73	69.22	18.86	8.99	24.64	<.001	2.41
Sights and sounds	14.29	4.07	11.60	3.58	1.81	50	.076	0.70
Baby's appearance and behavior	57.43	6.83	32.07	12.72	5.13	50	<.001	2.48
Parental role alteration	31.57	3.26	25.56	7.46	3.63	18.13	.002	1.04

Differences between scores on measures of prior trauma, NICU stress, and depressive and anxiety symptoms were examined between PTSD groups (those who screened positively for PTSD by meeting the clinical cutoff and those who did not). Results of these comparisons are summarized in Table 5. Women who screened positively for PTSD scored significantly higher on nearly all measures including two of the three PSS: NICU subscales with large effects. Those screened positively for PTSD did report significantly more stress related to the sights and sounds of the NICU, but this difference only approached significance. Chi-square analysis revealed that women who screened positively for PTSD were significantly more like to also screen positively

for depression [ $\chi^2(1) = 16.23, p < .001$ ] or anxiety [ $\chi^2(1) = 9.13, p = .003$ ], with all seven women scoring above the clinical cutoff on the PCL5 also scoring above the clinical cutoff on the EPDS and HADS-A.

Table 6

*Correlations among Prior Trauma, NICU Stress, and Emotional Distress Measures in Total Sample*

	1	2	3	4	5
1. Depressive symptoms	-				
2. Anxiety symptoms	.85**	-			
3. Prior trauma	.37*	.35*	-		
4. PTSD symptoms	.70**	.69**	.43*	-	
5. NICU stress	.42*	.56**	.42*	.64**	-

*Note.* \* $p < .05$ . \*\* $p < .001$ .

Table 7

*Correlations among Prior Trauma, NICU Stress, and Emotional Distress Measures in Women Reporting a Traumatic Childbirth*

	1	2	3	4	5
1. Depressive symptoms	-				
2. Anxiety symptoms	.87**	-			
3. Prior trauma	.44*	.43*	-		
4. PTSD symptoms	.78**	.75**	.45*	-	
5. NICU stress	.62**	.62**	.44*	.75**	-

*Note.* \* $p < .05$ . \*\* $p < .001$ .

Correlation analysis was performed to examine relationships among prior trauma, NICU stress, and the emotional distress measures of PTSD, depressive, and anxiety symptoms. It was hypothesized that symptoms of PTSD would be positively correlated with cumulative exposure to prior traumatic events (hypothesis 4), depressive symptoms (hypothesis 5), and anxiety symptoms (hypothesis 6). As shown in Table 6, scores on all measures were significantly

correlated with the other measures in the expected direction. This same correlation analysis was performed including only women who reported a traumatic childbirth. As shown in Table 7, correlations remained significant among all measures, with most strengthening slightly. For example, correlation between EPDS and HADS-A scores increased from .85 in the total sample to .87 in mothers reporting a traumatic childbirth. The relationship between NICU stress and EPDS score was much stronger in women reporting a traumatic childbirth compared with the full sample, with the correlation increasing from .42 to .62.

### **Aim 2: Effect of NICU Stress on the Relationship between Traumatic Childbirth and PTSD**

The second specific aim was to determine the influence of NICU stress on the relationship between appraisals of a traumatic childbirth and childbirth-specific PTSD symptoms while accounting for prior trauma and symptoms of anxiety and depression. Process (Hayes, 2013) was used to conduct a moderation analysis examining the influence of NICU stress on the relationship between traumatic childbirth and PTSD symptoms. It was hypothesized that NICU stress would moderate the relationship between traumatic childbirth appraisal and PTSD symptoms (hypothesis 7). The predictor variable was identified as the dichotomous self-report of a traumatic childbirth, the moderator was identified as total score on the PSS: NICU, and the criterion variable was identified as total score on the PCL-5. Following examination of correlations between demographics and measures under the first specific aim, the covariates of infant gestational age at birth, infant birth weight, duration of hospitalization in the NICU, and total scores on the SLESQ, EPDS, and HADS-A were included in analysis. All continuous variables were standardized to Z-scores prior to analysis.

Regression analysis revealed that the full model was significant,  $F(9,37) = 9.00$ ,  $R^2 = .70$ ,  $p < .001$ , 95% CI (0.58, 0.82). Table 8 displays the separate influences of each variable on PCL-

5 scores. The interaction between a traumatic childbirth and PSS: NICU was the only significant contributor to the variance in PCL-5 scores, suggesting moderation occurred,  $F(1, 37) = 5.70$ ,  $\Delta R^2 = .05$ ,  $p = .02$ , 95% CI (-0.6, 0.16).

Table 8

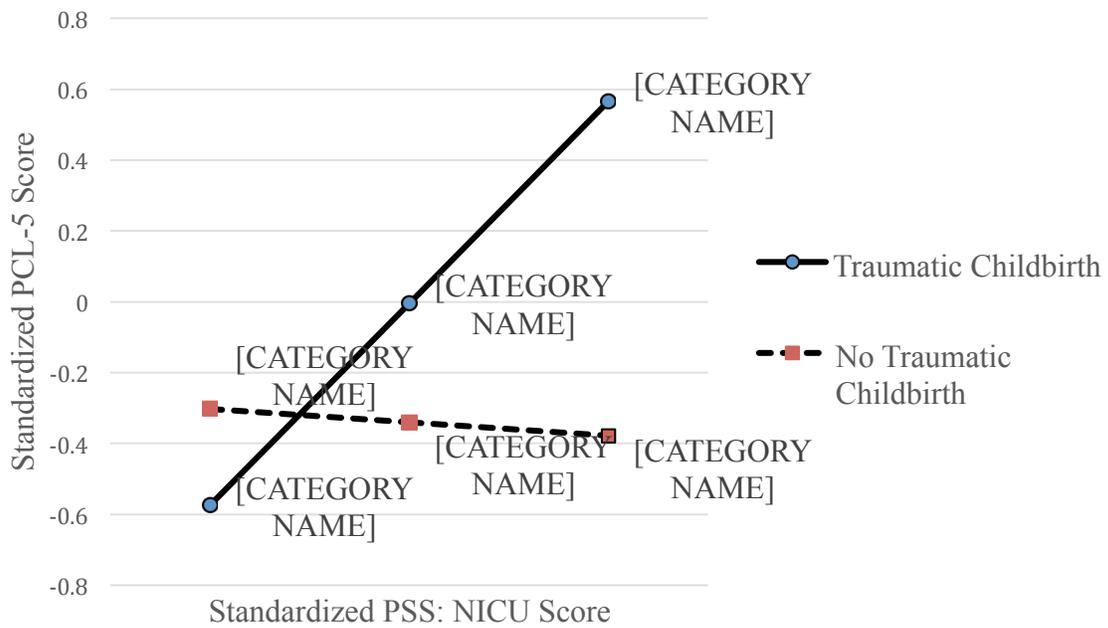
*Moderation of the Relationship between Traumatic Childbirth and PTSD by NICU Stress*

	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Traumatic childbirth	.24	.24	1.36	.18
NICU stress (PSS:NICU)	-.04	.22	0.17	.87
Interaction (traumatic childbirth x PSS:NICU)	.61	.26	2.39	.02
Gestational age	-.25	.32	0.77	.44
Birth weight	.05	.24	0.22	.83
Duration of NICU stay	-.37	.22	1.66	.11
Prior trauma (SLESQ)	-.01	.09	0.48	.96
Depression (EPDS)	.38	.21	1.77	.08
Anxiety (HADS-A)	.08	.22	0.34	.73

The conditional effect of a traumatic childbirth on PTSD symptoms at different values of NICU stress is demonstrated in Figure 2. At low levels of the moderator (standardized PSS: NICU score = -.98), the effect of a traumatic childbirth on PTSD symptoms was not significant,  $t(46) = 1.12$ ,  $b = -.27$ ,  $p = .27$ . Similarly, traumatic childbirth did not significantly affect PTSD symptoms at medium levels of the moderator (standardized PSS: NICU score = .02),  $t(46) = 1.39$ ,  $b = .34$ ,  $p = .17$ . However, at high levels of the moderator (standardized PSS: NICU score = 1.01), traumatic childbirth significantly influenced PTSD symptoms,  $t(46) = 2.17$ ,  $b = .94$ ,  $p = .04$ . Participants reporting a traumatic childbirth and high NICU stress reported higher PTSD scores compared with mothers who reported high NICU stress but did not report a traumatic childbirth. At low and medium levels of NICU stress, PTSD scores between mothers who reported a traumatic childbirth and those who did not were not significantly different.

Figure 2

*Conditional Effect of Traumatic Childbirth Appraisal on PTSD Symptoms at Levels of NICU Stress*



## **CHAPTER IV: DISCUSSION**

The purpose of this research was to add to the traumatic childbirth and childbirth-specific PTSD literature by describing and exploring appraising one's childbirth as traumatic (i.e., believing there is threat of death or serious injury to the self or infant during childbirth) and childbirth-specific PTSD in NICU mothers who had recently given birth. Self-appraisals as the childbirth experience as traumatic was operationalized in accordance with the DSM-5 criterion A and a clinically appropriate and validated tool was utilized to measure PTSD diagnosis in accordance with DSM-5 criteria. Data analysis revealed that all hypotheses were supported. Prior to this research, no information on the proportion of NICU mothers perceiving their childbirth experience as traumatic or the relationship between this perception and postnatal PTSD, anxiety, or depression was available. Furthermore, the current study is the first to investigate the potential influence of the unique experiences during NICU hospitalization on the relationship between traumatic childbirth and childbirth-specific PTSD while controlling for risk factors of poor adjustment including prior traumatic experiences and symptoms of emotional distress.

### **Traumatic Childbirth Experienced by NICU Mothers**

Past reports on the proportion of mothers who appraised their childbirth as traumatic identified a wide range of prevalence estimates from 20% to 84% (Alcorn et al., 2010; Boorman et al., 2014). No prior research had reported on the proportion of NICU mothers who viewed their childbirth experience as traumatic in accordance to DSM-IV or DSM-5 Criterion A. Therefore, the prevalence reported here is the first estimate using DSM-5 criteria in a sample of NICU mothers. In the current study, the rate of self-reported subjective experience of a traumatic childbirth was 69%. These results suggest that the proportion of NICU mothers who appraise their childbirth as traumatic falls at the upper end of the range of prevalence estimates available

in non-NICU or combined NICU and non-NICU samples. However, the relationship between the current and past reports is complicated for several reasons. First, studies from which prevalence rates are drawn often did not specifically sample from populations of non-NICU mothers (e.g., Stramrood et al., 2011). Therefore, samples likely combined NICU and non-NICU mothers leading to an inability to make direct comparisons between NICU and non-NICU mothers. Second, the recent changes to the DSM diagnostic criteria mean assessment of Criterion A in prior studies is outdated. While some studies report on the proportion of mothers meeting DSM-IV Criterion A1 and A2, many do not separate the proportion of their sample meeting either criterion separately. It is likely that fewer women would have met both aspects of criterion A for PTSD within the DSM-IV, which required fear of death or injury and the subjective perception of terror and/or helplessness, than only the first, which is the current diagnostic criterion.

All mothers reporting a traumatic childbirth in the current study indicated they feared for their baby's life or that their baby would be seriously injured during childbirth. This result is not surprising given the inclusion criterion of NICU admittance for the current analysis. Infants hospitalized in the NICU require intensive, specialty care indicating significant threat to the baby's health upon or shortly after birth (Osterman et al., 2011). Infants of mothers experiencing a traumatic childbirth were also more likely to be born prematurely and at a lower birth weight, necessitating longer hospitalization.

Thirty-two percent of the mothers reporting a traumatic childbirth also reported a perceived threat to their own life or that they would suffer serious injury during birth. Mothers who appraised their childbirth as traumatic were more likely to report high-risk pregnancies with at least one reported pregnancy complication and an emergent childbirth in the form of an unplanned C-section. Furthermore, women who reported fear for their own life or injury to the

self, experienced significantly more childbirth complications than women who only reported fear for their baby's life or injury to their baby. The increased likelihood of these women to report at least one pregnancy complication and to give birth through an unplanned or emergent C-section suggests additional atypical childbirth experiences focused on the mother, as well. These experiences support the existence of an objective threat of death or injury to the mother occurring during childbirth. However, without additional qualifying information regarding the specific nature of these experiences, a determination of objective threat cannot be made.

Women who reported a traumatic childbirth were at increased risk for poor adjustment due to prior trauma exposure. The average number of prior traumatic events reported among mothers who reported a traumatic childbirth (1.74) was over double that of the non-traumatic childbirth group (0.65). However, scores between these groups did not differ on the postnatal emotional distress measures of depression and anxiety. Although the difference in total score on the PCL-5 did not reach significance, mothers reporting a traumatic childbirth did report more overall PTSD symptoms and significantly more symptoms of intrusion and avoidance. Therefore, women with greater prior trauma exposure were more likely to perceive their childbirth as traumatic, but women who perceived their childbirth as traumatic were no more likely to experience non-trauma-related symptoms of emotional distress.

### **Childbirth-specific PTSD Experienced by NICU mothers**

Scores on the PTSD measure in the total sample ranged dramatically. Some women reported the absence of any PTSD symptoms (score of 0), while others scored well above the clinical cutoff for PTSD. Mothers of infants born prematurely and at a lower birth weight with longer hospital stays scored highest on the measure of childbirth-specific PTSD symptoms, with symptoms of avoidance and alterations in cognition and mood being related to infant birth

weight and gestational age, respectively. However, alterations in cognition and mood (Cluster D; i.e., social isolation, self-blame for things that happened during childbirth, and negative feelings including fear, horror, guilt, and shame) and alterations in arousal and reactivity (Cluster E; i.e., sleep and concentration difficulties, hypervigilance, and irritability) were the most commonly reported symptoms. This pattern did not hold true when distinguishing between mothers who reported a traumatic childbirth and those who did not, with mothers reporting a traumatic childbirth experiencing increased intrusion (Cluster B; i.e., disturbing memories and upsetting reminders of giving birth) and avoidance (Cluster C; i.e., avoiding memories, thoughts, or external reminders of giving birth) symptoms. The most commonly reported PTSD symptom Clusters D and E have substantial overlap with symptoms of emotional distress (i.e., depression and anxiety) and adjustment to motherhood. In contrast, mothers who reported traumatic childbirth had unique symptomatology that represent hallmark features of PTSD that do not typically occur in other emotional disturbances or typical adjustment to motherhood.

Based on previously published reports of postnatal PTSD in NICU mothers, it was hypothesized that approximately 15% of the sample would meet the clinical cutoff for PTSD. Although the prevalence in the current sample (13%) was slightly below the hypothesized prevalence, 20% of the mothers who reported a traumatic childbirth screened positively for PTSD. In other words, one in five women met full diagnostic criteria for PTSD in accordance with DSM-5 including Criterion A and symptom experience above the clinical cutoff. In fact, none of the mothers who denied experiencing a traumatic childbirth scored above the clinical cutoff for PTSD.

PTSD symptoms were positively correlated with measures of emotional distress and prior trauma with medium-to-large effects. Symptoms of postnatal depression and anxiety showed the

strongest correlations with PTSD symptoms. Greater prior exposure to traumatic events was also associated with increased childbirth-specific PTSD symptoms. All of the mothers who screened positive for PTSD also screened positive for both depression and anxiety. Depression, anxiety, and PTSD are often co-occurring emotional problems (APA, 2013). A recent systematic review identified the prevalence of triple co-morbidity of PTSD, depression, and anxiety following childbirth in samples of NICU and non-NICU mothers to be less than 3% (Agius, Xuereb, Carrick-Sen, Sultana, & Rankin, 2016). As the symptoms for depression and anxiety overlap with some symptoms of PTSD, it is possible that elevated distress related to one type of emotional problem contributed to elevations on another measure of distress. As the prevalence of triple comorbidity is much higher in the current study (13%) than the previously identified prevalence, NICU mothers may be at increased risk to experience triple co-morbidity than non-NICU mothers. Furthermore, as over one-third of the sample had infants currently hospitalized in the NICU, these scores may have been elevated due to the current and continued stress these participants experienced. Further assessment of specific symptom experience would be necessary to evaluate shared and specific variance related to each type of distress in this population.

### **Experience of NICU Stress**

NICU stress was measured as the perceived stress associated with NICU experiences in three categories: the sights and sounds of the unit, the baby's appearance and behavior, and alterations in the parental role. All mothers in the current sample reported experiencing some stress in each of these categories, but the highest stress scores were related to parental role alteration. In fact, every mother rated the item "being separated from my baby" as at least moderately stressful. Mothers with lower levels of education tended to score higher on this scale. Higher stress related to the baby's appearance and behavior (i.e., seeing tubes or equipment near

the baby and seeing needles and tubes put in the baby) was reported by mothers who experienced at least one pregnancy complication and whose infant was born prematurely and at a lower birth weight, necessitating a longer hospital stay.

NICU stress was significantly positively correlated with all measures of emotional distress and prior trauma. This finding is consistent with past reports of relationships between perceived stress and emotional distress (e.g., Holditch-Davis et al., 2009). Total NICU stress demonstrated the strongest correlation with PTSD symptoms. Anxiety symptoms also demonstrated a strong correlation with a large effect, and prior trauma and depressive symptoms demonstrated medium effects. When correlations were examined in only mothers reporting a traumatic childbirth, PTSD, anxiety, and depressive symptoms all demonstrated strong correlations with large effects. These results suggest that women experiencing high NICU stress also experience symptoms of emotional distress, and that this relationship is especially strong following a traumatic childbirth experience.

Mothers who reported a traumatic childbirth also reported higher overall NICU stress and stress related to the baby's appearance and behavior. Although falling short of significance, mothers reporting a traumatic childbirth also reported higher stress related to the sights and sounds of the unit and parental role alteration. Mothers who scored above the clinical cutoff for PTSD also scored significantly higher on the full NICU stress measure and the two subscales of parental role alteration and infant appearance and behavior. As women who reported a traumatic childbirth gave birth to infants who were hospitalized longer, and PTSD symptoms were positively correlated with the length of hospital stay, it is possible that these mothers were more likely to experience more stressful experiences associated with the NICU than mothers of infants who were hospitalized for a shorter period of time.

## **Relationships among Traumatic Childbirth, NICU Stress, and PTSD**

The second aim of this study was to examine the influence of stress on the relationship between a traumatic childbirth and PTSD. Results supported the hypothesis that NICU stress would moderate the relationship between appraisal of one's childbirth as traumatic and PTSD. Mothers who did not report a traumatic childbirth showed no significant influence of NICU stress on PTSD symptoms at low, medium, or high levels of stress. However, mothers who appraised their childbirth as traumatic were more likely to develop childbirth-specific PTSD symptoms when NICU stress was high. In fact, a significant relationship between traumatic childbirth appraisals and PTSD symptoms existed in the current sample only when NICU stress was high. In accordance with theories of PTSD maintenance (Ehlers & Clark, 2000) and perceived stress (Folkman et al., 1986; Magnusson, 1982), negative appraisals of the childbirth experience as traumatic could be maintained by high NICU stress, which may be interfering with the mother's perceived ability to cope. The experience of high stress related to the original PTSD trigger (traumatic childbirth) is maintaining the perception of the threat as continuing and currently threatening.

There are potential alternate explanations for this relationship. Ratings of high stress related to the NICU experience may be reflective of fewer personal resources to cope with NICU stress including low social support and poor coping mechanisms, leading to perceived inability to cope with demands of having a child in the NICU (Miles et al., 1993). Mothers who utilized positive and effective coping skills would likely not perceive NICU experiences to be as stressful as those utilizing poor coping skills. Therefore, the influence of NICU stress demonstrated here may be reflective of perceptions influenced by underlying coping difficulties. No research to date has examined coping specifically with NICU stress. However, in a study of coping mechanisms

in NICU mothers, Shaw and colleagues (2013) found that dysfunctional coping style assessed soon after childbirth was related to increased likelihood to experience clinically significant PTSD at one month postpartum. Further investigation into the role of coping styles as they relate to stress and PTSD symptomatology is necessary to better understand this complex relationship.

High stress related to other experiences (e.g., financial stress, work stress) could also be negatively affecting wellbeing by overwhelming perceived ability to cope with concurrent stressors. Furthermore, mothers may have had additional exposure to traumatic experiences while their infant was hospitalized related to emergent medical procedures and illness complications. In the current study, NICU stress was correlated with infant birth weight, gestational age, and length of NICU stay. Mothers whose infant was born more prematurely and/or was hospitalized longer had to cope with stress for a longer period of time and were likely to have greater exposure to additional stressful NICU experiences. Additional sources of stress, coping mechanisms, and specific medical experiences in the NICU were not assessed in the current study. Assessment of these experiences is necessary in order to more fully understand the relationship between NICU stress and PTSD symptomatology.

### **Limitations**

The current study is not without limitations. The current sample was quite demographically homogenous. Participants were mostly married, White women with a high annual household income and a college education. Women who identified as a racial minority and reported a lower education also reported a more extensive prior trauma history. As past research has documented higher rates of emotional distress, trauma, and PTSD among minority women and low-income populations (APA, 2013), replication of the current study with a sample of low-income and racial/ethnic minority women could potentially yield higher prevalence of

traumatic childbirth appraisals and PTSD. The lack of diversity in the current sample is somewhat surprising, as rates of NICU hospitalization are higher among racial minorities than in White women. However, demographics in the current sample are similar to those found in online research in this area (Ayers et al., 2009).

The use of an online recruitment method was also a limitation of this study for several reasons. First, the recruitment method likely limited the demographic diversity of the sample. As women self-selected into the study through an online interface, recruitment was limited to those who had the means to utilize the online software, came across the study advertisement, were able to read English, and were willing to report personal experiences of trauma and distress. The online recruitment method also eliminated the possibility to obtain medical data from electronic health records, which could support the objective measurement of a traumatic childbirth rather than relying on self-report of subjective perception of threat to life or of injury. The list of pregnancy and childbirth complications included in the survey was not exhaustive, and no guidelines currently exist for determining the objective nature of a threat during childbirth. Finally, Ayers and colleagues (2009) demonstrated that report of a traumatic childbirth differs between community and online samples, with online samples reporting significantly higher rates of a traumatic childbirth and postnatal PTSD. Thus, it is possible that rates may be higher in this online sample than in other sample types. An online interface may have led to increased comfort for women to disclose personal traumatic experiences and symptoms.

Several measurement limitations exist as well. The PCL-5 is a new measure that, to my knowledge, was utilized with a postpartum sample for the first time in the current study. Thus, no validation data exist for postpartum women. There were also many additional variables that could have influenced the current study's results, but were not measured here in the interest of

keeping participant burden low. These include but are not limited to coping style, self-efficacy to cope, social support, and the experience of death of a child. Although participants in the current study did report if they had an older child hospitalized in the NICU, the nature of their older child's hospitalization was not assessed. Having an older child whose health during the NICU stay was more severe could be an additional traumatic experience increasing risk to experience PTSD following an additional NICU stay. Furthermore, the perceived stress measure utilized here is specific to the NICU. It is unknown if alternative types of stressors or stress from other sources (e.g., parenting, finances, relationships) would exacerbate postnatal PTSD symptoms in the same way demonstrated here. Replication of the current study with alternative measurement tools and participant samples would add to the literature. These modifications might include using a general stress measure, assessing relationships between general stressors and NICU stress, and conducting research with a more diverse sample to provide additional information regarding the relationship between perceived stress and postnatal PTSD.

Measurement timing was also a limitation. The report of a traumatic childbirth and NICU stress in the current study was retrospective for many participants. Although I attempted to minimize the effects of delayed recall by limiting study participation to one-to-three months postpartum, this approach still left room for error in recall. Furthermore, mothers could have experienced additional traumatic experiences during their child's NICU hospitalization including witnessing distressing medical events or interventions. Exposure to these additional experiences may have increased their symptom experience or altered their memory of the severity of fear during childbirth itself.

## **Implications and Future Directions**

The results of this study highlight the necessity to assess for trauma and stress in NICU mothers. The high prevalence of traumatic childbirth indicates that most NICU mothers are in distress during and/or just after giving birth. Educating maternal-child healthcare workers on the likelihood of parental distress may help clinicians and providers better recognize symptoms of traumatic stress and ultimately improve care for these women.

This study opens the door for continued research on traumatic childbirth using the current diagnostic criteria for PTSD. Given the recent nature of the update to the DSM-5, the majority of information in this area is now out-of-date. Therefore, additional assessment of the development of postnatal PTSD in NICU mothers using criterion A from the DSM-5 is necessary. Creating an objective measure of traumatic childbirth using pregnancy, childbirth, and neonatal complications shown to present an objective threat of injury or death would also ensure that all DSM-5 criteria for PTSD could be identified.

Although the current study establishes a crude timeline of the development of postnatal PTSD beginning with a traumatic childbirth and followed by NICU stress, repeated measurement of stressors and symptoms over time would allow for a more specific longitudinal model to be developed. Understanding the progression of stressors and symptoms and their maintenance and resolution could lead to the development of effective treatments. Finally, future work should measure the effects of these experiences on mother-infant interaction including attachment and bonding and maternal-child health along with progression of traumatic stress symptoms across and following the NICU stay in order to better understand the implications for maternal-child health outcomes (Bosquet-Enlow et al., 2014).

Clinical interventions with NICU mothers should focus on improving understanding of the nature of the objective threat during birth and coping with ongoing NICU stressors, as increased understanding of the context of the potentially traumatic event may decrease immediate distress. Some intervention research has developed coping skills training for NICU parents focused on increasing knowledge of NICU interventions at the time of hospital admission, including the NICU Creating Opportunities for Parent Empowerment (COPE) intervention (Melnyk et al., 2006). In an evaluation of this intervention's effectiveness, parents were provided with audio recordings and pamphlets including information regarding what they could expect during their infant's NICU stay. The NICU COPE program also includes behavioral suggestions aimed at increasing parental participation in infant care in the NICU. Results demonstrated decreased anxiety and depression with use of the NICU COPE program.

Although aiming to decrease parental distress through education and involvement in care, the NICU COPE program does not address parental factors theoretically linked to PTSD and perceived stress including negative appraisal of childbirth, coping style, and negative cognitions. Furthermore, this intervention lacks supportive interaction with someone knowledgeable of not only the NICU experience but also of the ongoing dynamics with adjustment to becoming a NICU mother. Thus, an intervention encompassing these personal factors and emotional support may be effective in specifically addressing traumatic childbirth, childbirth-specific PTSD, and perceived NICU stress.

This study also emphasizes the need to move upstream of postnatal PTSD by improving preventative methods of appraisal of traumatic childbirth. Prenatal interventions should include preparing mothers for the possibility of childbirth complications and guiding them through appropriate and realistic coping mechanisms. For mothers who have prior knowledge that their

infant will require NICU hospitalization, providing information similar to that provided in the NICU COPE program could potentially mitigate the severity of negative appraisals of NICU intervention during childbirth. Identifying risk factors that increase the likelihood for mothers to appraise their childbirth as traumatic even when objective medical threat of death or injury is low will be especially important in developing these interventions, which do not yet exist.

The current study has added to the traumatic childbirth, postnatal PTSD, and NICU literature by providing support for a model incorporating these three distinct experiences. Although a substantial post-natal PTSD literature base is growing, increased use of appropriate clinical measurement tools consistent with the current diagnostic criteria is needed to determine appropriate preventative mechanisms and treatment targets. This study emphasizes the importance of appropriate and accessible mental health care surrounding the perinatal period. However, only with more research can effective interventions be designed and evaluated that are aimed at decreasing the prevalence of these problems to improve maternal-child health.

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APPENDIX A: RECRUITMENT FLYER

# Moms... We Need You!



**Participants needed for a research study about what it is like for a mother after having a baby.**

**In this study, you will:**

Complete an online survey about your experiences with childbirth – positive and negative.

**You are eligible to participate if:**

You are a woman who is at least 18-years-old, living in the United States *and* has given birth to a living child between 1 and 3 months ago

**Interested in participating?**

You can access the online survey at:

**[https://ecu.az1.qualtrics.com/SE/?SID=SV\\_5cLfj55V3vc85P7](https://ecu.az1.qualtrics.com/SE/?SID=SV_5cLfj55V3vc85P7)**

*or* visit the study Facebook page at:

**[Facebook.com/ChildbirthWellbeing](https://www.facebook.com/ChildbirthWellbeing)**

**Research is always voluntary and confidential!**



This research study is being conducted by the Department of Psychology at East Carolina University. It has been approved by ECU's Institutional Review Board. If you have any questions, please contact the Principal Investigator, Meghan Sharp, at [sharpm13@students.ecu.edu](mailto:sharpm13@students.ecu.edu) or 252-328-4213.

## **APPENDIX B: CONSENT DOCUMENT**

### **INFORMED CONSENT**

Dear Participant,

I am a doctoral student at East Carolina University (ECU) in the Department of Psychology. I am asking you to take part in my research study entitled, "Examining the Relationship between Childbirth and Maternal Well-being". The purpose of this letter is to let you know more about the study so you can decide whether to volunteer for the study or not.

The purpose of this research is to study different kinds of stress related to having a baby and/or having a baby hospitalized in the Neonatal Intensive Care Unit (NICU). By doing this research, I hope to learn how these kinds of stress are related to maternal well-being. Your participation is completely voluntary.

The participants in this research are women who are at least 18-years-old, live in the United States, and have given birth to a living child between one and three months ago. The amount of time it will take you to complete this survey is about 10-20 minutes.

If you agree to take part in this survey, you will be asked questions that relate to your experiences with pregnancy, childbirth, and motherhood, both positive and negative, and your current well-being (e.g., symptoms of anxiety and depression). You will also be asked some questions about prior life events you may have experienced and that may have been upsetting to you (e.g., surviving a severe car accident or medical illness). You will also be asked some questions about your and your baby's medical history (e.g., your baby's birth weight, complications during pregnancy) and to provide your basic demographic information (e.g., age and marital status). If your baby was hospitalized in the NICU, you will be asked some additional questions about your experience in the NICU.

This research is overseen by the ECU Institutional Review Board. Therefore some of the IRB members or the IRB staff may need to review my research data. However, the information you provide will not be linked to you. Therefore, your responses cannot be traced back to you by anyone, including me.

If you have questions about your rights when taking part in this research, call the Office of Research Integrity & Compliance (ORIC) at phone number 252-744-2914 (days, 8:00 am-5:00 pm). If you would like to report a complaint or concern about this research study, call the Director of ORIC, at 252-744-1971.

You do not have to take part in this research, you can choose to skip any items you do not want to answer, and you can stop at any time by exiting the survey. If you decide you are willing to take part in this study, indicate your consent below by selecting the "Yes, I would like to continue on the next part of this study" option. You can also print a copy of this form for your records.

Thank you for taking the time to participate in my research.

Sincerely,  
Meghan Sharp  
Principal Investigator  
252-328-4213  
sharpm13@students.ecu.edu

**Would you like to continue participation in this study? (You are not giving up any rights by indicating consent).**

- YES, I would like to continue on to the next part of the study.
- NO, I would not like to continue with this study.

## APPENDIX C: IRB APPROVAL



**EAST CAROLINA UNIVERSITY**  
**University & Medical Center Institutional Review**  
**Board Office**

4N-70 Brody Medical Sciences Building · Mail Stop 682  
600 Moyer Boulevard · Greenville, NC 27834  
Office **252-744-2914** · Fax **252-744-2284** · [www.ecu.edu/irb](http://www.ecu.edu/irb)

### Notification of Initial Approval: Expedited

From: Social/Behavioral IRB

To: [Meghan Sharp](#)

CC: [Christyn Dolbier](#)

Date: 11/3/2015

Re: [UMCIRB 15-001350](#)

Examining the Relationship between Childbirth and Maternal Well-being

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 11/2/2015 to 11/1/2016. The research study is eligible for review under expedited category # 7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
Consent form	Consent Forms
Email recruitment	Recruitment Documents/Scripts

No suicidality - MH resources  
Recruitment flyer  
Study protocol - clean  
Study protocol - tracked changes  
Study questionnaire - clean  
Study questionnaire - tracked changes  
Suicidality - MH resources

Surveys and Questionnaires  
Recruitment Documents/Scripts  
Study Protocol or Grant Application  
Study Protocol or Grant Application  
Surveys and Questionnaires  
Surveys and Questionnaires  
Surveys and Questionnaires

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

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IRB00000705 East Carolina U IRB #1 (Biomedical) IORG0000418  
IRB00003781 East Carolina U IRB #2 (Behavioral/SS) IORG0000418

**APPENDIX D: MENTAL HEALTH RESOURCES FOR WOMEN REPORTING NO  
SUICIDALITY**

**Thank you for your participation!**

The time following childbirth can be rewarding, and it can also be stressful and challenging for many women. The following organizations can provide you with information and support related to stress and emotional well-being.

**The Postpartum Stress Center:** <http://postpartumstress.com/>

**Postpartum Support International:** <http://www.postpartum.net/>

**Hand to Hold (support for NICU families):** <http://handtohold.org/>

**National Center for Posttraumatic Stress Disorder:** <http://www.ptsd.va.gov/>

**Rape, Abuse, and Incest National Network:** <https://rainn.org/>

If you or someone you know is in crisis and/or considering suicide, please call the **National Suicide Prevention Lifeline** at 1-800-273-TALK or visit <http://www.suicidepreventionlifeline.org/>.

## APPENDIX E: MENTAL HEALTH RESOURCES FOR WOMEN REPORTING SUICIDALITY

### Thank you for your participation!

The time following childbirth can be rewarding, and it can also be stressful and challenging for many women.

On this survey, you indicated that you have had thoughts of harming yourself. If you are in crisis and/or considering suicide, please call the **National Suicide Prevention Lifeline** at 1-800-273-TALK or visit <http://www.suicidepreventionlifeline.org/>. Trained counselors are available 24-hours to speak with you for free, at any time. You will also be able to explore resources to find a counselor or support group near you to get the help you need.

The following organizations can provide you with additional information and support related to stress and emotional well-being.

**The Postpartum Stress Center:** <http://postpartumstress.com/>

**Postpartum Support International:** <http://www.postpartum.net/>

**Hand to Hold (support for NICU families):** <http://handtohold.org/>

**National Center for Posttraumatic Stress Disorder:** <http://www.ptsd.va.gov/>

**Rape, Abuse, and Incest National Network:** <https://rainn.org/>