Prior research has identified risk factors that may contribute to the development of maternal stress reactions following childbirth. Specifically, situational factors (e.g., factors associated with childbirth), individual factors, and personality factors, have been explored in a multitude of prior studies. The current study sought to build upon this literature by examining both risk and resilience in a sample of both mothers and fathers via a prospective longitudinal investigation. Baseline assessment of expectant parents occurred prior to the birth of their child, with additional assessment at approximately 1, 6, and 9 weeks post-childbirth. A total of 50 participants completed all four of these assessments. Results indicated approximately 20% ($n = 10$) of participants endorsed moderate or greater stress symptoms after birth, while 22% ($n = 11$) also exhibited symptoms of moderate or greater depressive symptoms. Stress reactions were assessed with the Perinatal Posttraumatic Stress Disorder Questionnaire (PPQ); validity analyses indicated the PPQ had significantly stronger correlations with convergent measures than discriminant measures. Additionally, participants were randomized into one of two post-delivery study arms: an expressive writing group or an active control group. Although expressive writing results were inconclusive, there was a general effect of time, which may be reflective of a natural recovery process. Given the prevalence of stress and depressive reactions in this sample, and the population, exploration into feasible and accessible treatment interventions is warranted. While these results also suggest a potential natural recovery for some participants, interventions for support in the short-term timeframe after childbirth may continue to be useful.
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CHAPTER I

INTRODUCTION

A 2007 report by Kids Count, funded by the Annie E. Casey Foundation, detailed the growing prevalence of premature births in the United States and reported that prevalence rates increased in all but one state from 1990 to 2004. Rates of premature birth in the United States ranged from a low of 8.3% in Vermont to a high of 17.9% in Mississippi, with the national prevalence rate found to be 12.5%. Additionally, in 2004, prevalence rates for preterm births were greatest for Black Non-Hispanics (17.9%) and American Indian or Alaska Natives (13.75%). Most notably, with respect to the current study, the rate of premature births in Texas was 13.7% (8th most prevalent state). Within the Dallas-Fort Worth metropolitan area, the 2009 city-specific figures from Kids Count report prevalence rates for premature birth of 13% and 12%, respectively.

Prevalence of Stress Reactions to Childbirth

Studies have shown the emergence of clinically significant stress symptoms in mothers after childbirth. For example, the prevalence rate of posttraumatic stress disorder (PTSD) 7-18 months after childbirth was found to be 9% in mothers (Beck, Gable, Sakala, Declerq, 2011). Greater rates of PTSD have been found among mothers of high-risk and premature infants; for example, two studies concerning infants in the Neonatal Intensive Care Unit (NICU) have reported a PTSD rate of 23.8% (Feeley, Zelkowitz, Cormier, Charboneau, Lacroix, & Papageorgiou., 2011; Vanderbilt, Bushley, Young, & Frank, 2009), which is a notable contrast from only 3% of mothers presenting with PTSD whose infants were in a well-baby nursery (Vanderbilt, Bushley, Young, & Frank, 2009). A 2003 study identified prevalence rates of 41% in mothers of high-risk infants, 26% in mothers of low-risk infants, and 4% in mothers of
healthy, full-term infants (Ansermet, Forcada-Guex, Muller-Nix, Nicole, & Pierrehumbert, 2003). Although 15% of mothers met diagnostic criteria for PTSD 30 days after their infant was admitted into the NICU, an additional 11.7% of mothers displayed subsyndromal PTSD (Lefkowitz, Baxt, & Evans, 2010). A smaller study indicated 9% of mothers of infants in the NICU met PTSD diagnostic criteria 4 months after their infant’s birth (Shaw, Bernard, DeBlois, Ikuta, Ginzburg, & Koopman, 2009). Furthermore, a 2003 qualitative study by Holditch-Davis, Bartlett, Blickman, and Miles identified PTSD symptoms experienced by mothers of high-risk premature infants in the Neonatal Intensive Care Unit six months after childbirth. All of the 30 mothers in the study experienced at least one PTSD symptom, while 12 experienced two symptoms, and 16 experienced three symptoms. Of these symptoms, 26 mothers reported experiencing increased arousal, 24 reported re-experiencing symptoms, and 24 reported avoidance symptoms. Although the prevalence rates vary, the overarching conclusion is the same: some mothers, particularly of high-risk infants, develop clinically significant symptoms of stress.

PTSD after childbirth is not just an issue impacting mothers, though, as many fathers have also been shown to develop symptoms of PTSD. Of 41 fathers assessed after their infants were admitted into the NICU, 8% met criteria for PTSD, while an additional 4% displayed subsyndromal PTSD (Lefkowitz, Baxt, & Evans, 2010). A very small study of 6 fathers identified 2 fathers meeting criteria for PTSD (33%; Shaw et al. 2009).

Interestingly, several instruments are available to measure PTSD and have been shown to provide different results and this may partially explain the varying prevalence rates in the extant literature. For example, Stramrood and colleagues (2010) provided 428 recent mothers with both the Traumatic Event Scale-B (TES-B) and PTSD Symptoms Scale-Self Report (PSS-SR).
Results indicated that more mothers met PTSD criteria when using the TES-B (5 mothers; 1.2%) than when using the PSS-SR (3 mothers; 0.7%). Only one mother met PTSD criteria on both scales. As illustrated by these studies, PTSD is a serious concern affecting both mothers and fathers after childbirth, especially when the infant is deemed to be at “high-risk” for complications.

As these prevalence rates indicate a statistically significant number of individuals may be at risk of developing clinically significant stress reactions following childbirth, a closer review of the literature is warranted. An abundance of research literature on the prevalence and development of stress reactions to childbirth are available, many of which indicate potential factors that may increase the likelihood of such a reaction. For example, in order to discover if women can develop symptoms consistent with posttraumatic stress disorder (PTSD) as a result of childbirth, Ayers and Pickering (2001) interviewed 289 pregnant women, and provided them with self-report questionnaires pertaining to PTSD symptoms and depression. Participants were given these questionnaires once during pregnancy, once at six weeks postpartum, and once at six months postpartum. After controlling for women who exhibited signs of PTSD or clinical depression during pregnancy, results indicated that 2.8% of women met criteria for PTSD at six weeks postpartum, which decreased to 1.5% at six months postpartum. Although mothers may not be experiencing symptoms of depression or trauma during pregnancy, this study identified the possibility of developing PTSD consistent symptoms after childbirth. Other studies have indicated specific aspects of the childbirth experience that may make a mother more likely to view the event as traumatic, and subsequently develop stress reactions.

For example, a study examining the prevalence and potential predictors of posttraumatic stress symptoms after childbirth was conducted by Czarnocka and Slade (2000). Participants
were 264 women who had just given birth within the previous 72 hours, and were followed up with a second set of questionnaires 6 weeks postpartum. Of these women, 3% met the criteria for PTSD, while an additional 24.2% met the criteria for at least one subset of PTSD. Additionally, 9.9% of participants reported clinically significant levels of avoidant or intrusive symptoms, while 10.6% reported significant levels of depression. Results indicated that trait anxiety, blaming staff for pregnancy difficulties, and not having a partner attending the birth were significant predictors of PTSD symptoms. Other significant predictors included a fear for self or past mental health problems, the latter of which also significantly predicted anxiety and depression.

Women who had experienced either partial or full PTSD symptoms significantly differed from non-symptomatic women on several aspects of their labor and birth. Symptomatic women were shown to have lower perceived control during labor, higher trait anxiety, and greater fear for the health and safety of their baby or themselves. They were also less likely to have a partner present, were less confident about their ability to cope, and were more likely to report that their experience was worse than they had expected. Furthermore, fully symptomatic women reported feeling that their partner or staff was less supportive during the childbirth process than did women who were partially symptomatic or non-symptomatic. As illustrated in this study, various aspects of the childbirth process can contribute to the development of traumatic and depressive symptoms after childbirth. In addition to childbirth factors, antecedent variables can play a significant role in the development of traumatic reactions, such as a prior trauma history. Understanding the ways antecedent and childbirth variables may influence childbirth outcomes is an important step to aiding women who may be at risk for developing stress reactions.
Soet, Brack, and Dilorio (2003) conducted an exploratory study to examine the prevalence of women perceiving childbirth as traumatic and potential contributing factors. One hundred and three women were provided with a questionnaire towards the end of their pregnancy, and were given a follow-up telephone interview four weeks after their due-date, in order to attain psychosocial measures and assess pregnancy complications, past trauma experiences, and perception of childbirth. A total of 34% of participants reported perceiving their childbirth as traumatic, while 40% of these women developed PTSD symptoms: 12 women were partially symptomatic and 2 women were fully symptomatic. An additional 19 women, who did not report perceiving their childbirth to be traumatic, experienced partial PTSD symptoms. Results indicated that event characteristics, such as severity of pain in the first stage of labor, increased feelings of powerlessness, increased medical interventions, and a negative difference between expectations of childbirth and the actual experience, were the strongest contributors to the perception of childbirth as traumatic. Antecedent characteristics, such as a history of sexual trauma, lower perceived social support, and a higher expectation of pain, also contributed to the perception of childbirth as traumatic. However, antecedent factors played a larger role in the development of PTSD symptoms; women who reported symptoms of PTSD had a stronger internal locus of control, higher state and trait anxiety, lower coping, and lower self-efficacy than women who did not report PTSD symptoms. This study not only presented potential event factors that may make an individual more likely to perceive childbirth as traumatic, but also presented personality factors that may make an individual more vulnerable to viewing an event as traumatic, and developing post-traumatic stress symptoms. These findings can enable medical professionals to alter characteristics about the childbirth process in order to increase the chance
of a positive childbirth experience, especially for women with increased vulnerabilities. For example, providing women with more options and a feeling of control during the labor process may reduce the likelihood of childbirth being perceived as negative or traumatic.

In addition to antenatal factors and childbirth factors, perceptions of intrapartum care can also have a predictive role in the development of maternal stress symptoms. Creedy, Shochet, and Horsfall (2000) investigated the relationship between childbirth and acute trauma symptoms using a prospective, longitudinal study with 499 pregnant women. Three potential predictive factors were examined during telephone interviews: antenatal factors, such as anticipatory anxiety, obstetric intervention during childbirth, and perception of intrapartum care. Results indicated that one third of the sample experienced a traumatic event during childbirth, such as extreme pain during childbirth or fear for her or her baby’s life, and were shown to have at least three trauma symptoms. Of the participants, 5.6% met the criteria for acute posttraumatic stress disorder, while an additional 22.6% displayed some, but not the required three, trauma symptoms. Level of obstetric intervention during childbirth significantly correlated with the development of acute trauma symptoms after childbirth; more specifically, having an emergency cesarean section, emergency forceps delivery, or high post-delivery pain had the strongest predictive relationships.

Furthermore, perception of inadequate intrapartum care was shown to have an additive role as a predictor. Participants who experienced higher amounts of obstetric intervention and a higher perception of inadequate care were shown to have the most acute trauma symptoms, more than participants who experienced only either high obstetric intervention or high perception of inadequate care. Additionally, perception of partner support was significantly correlated to the development of acute trauma symptoms after childbirth; those who reported feeling that their
partner was dissatisfied with the childbirth or did not want to speak about the childbirth were more likely to have acute trauma symptoms and to report higher dissatisfaction with the process. Experiencing unexpected procedures during childbirth, as well as perceiving a lack of support from a partner, are two aspects of childbirth that may serve as risk factors for trauma symptoms. In addition to these childbirth risk factors, the mother’s expectations of childbirth have also been investigated as potentially predictive of the perception of childbirth as being pleasant or traumatic, as well as subsequent stress reactions.

The predictive role of childbirth expectations were examined by Maggioni, Margola, and Filippi (2006), who conducted a study with 93 new mothers in order to assess the association between risk factors, expectations about childbirth, and the development of PTSD. These women were provided with questionnaires towards the end of their pregnancy and again 3-6 months after delivery, and were separated into low-risk and high-risk groups based on the number of pregnancy risk factors experienced. Results indicated that 2.4% of the sample met criteria for PTSD after childbirth, while an additional 32.1% met criteria for one or two subscales: 25% met arousal subscale criteria, 15.5% met intrusion subscale criteria, and 3.6% met avoidance subscale criteria. Fully-symptomatic mothers were shown to have significantly greater depression than partially-symptomatic or non-symptomatic mothers at both time points. Additionally, high-risk mothers had higher arousal scores, when compared to low-risk mothers, as well as higher PTSD scores overall.

When examining PTSD subscales, researchers found that pre-delivery depression was significantly associated with the intrusion subscale of PTSD, while pregnancy risk factors significantly influenced the arousal subscale. Furthermore, depression at both time points was significantly greater for women who met criteria for the positive intrusion subscale than for
women without intrusive symptoms. The same was true at the second time point for women with positive avoidance symptoms and for women with positive arousal symptoms, as these women displayed significantly higher depression scores than women without avoidance or arousal symptoms. Expectations of childbirth were not shown to have a significant effect on the development of PTSD, but women hoping for a “quick delivery” had significantly higher levels of trait anxiety than mothers with other expectations. These findings attest to the comorbidity among depression and PTSD both before and after childbirth, and also highlight the association among particular risk factors and subscales of PTSD. Although this study did not support the association between childbirth expectations and development of stress symptoms, other research has investigated anxiety sensitivity as a potential predictor in the development of stress symptoms.

Anxiety sensitivity is an individual’s fear of anxiety-related symptoms, such as an increased heart rate or sweating. Looking to investigate if anxiety sensitivity predicts PTSD symptoms after childbirth, Keogh, Ayers, and Francis (2002) conducted a prospective pilot study of 40 pregnant women. Participants were provided with self-report questionnaires at 36 weeks of pregnancy and 2 weeks after childbirth, which assessed factors such as prenatal anxiety sensitivity, psychological distress both before and after childbirth, and postpartum PTSD symptoms. Although participants were asked questions about their trauma history before giving birth, prenatal PTSD symptoms were not assessed. Results indicated a significant correlation between prenatal anxiety sensitivity and postnatal PTSD symptoms, with the social concern subset and total score having the strongest predictive relationships. Additionally, the social dysfunction scale of the prenatal General Health Questionnaire (GHQ) was significantly
correlated with postnatal PTSD symptoms, as was the total scale of the postnatal GHQ. Prenatal trauma history was not significantly correlated with postnatal PTSD symptoms.

Several obstetric factors during childbirth significantly correlate with the development of postnatal PTSD symptoms, such as a lack of positive emotions during birth, lack of control of analgesia, analgesic effectiveness, and lack of support from the midwife. Furthermore, Keogh and colleagues examined differences among participants based on delivery type, and found that women who had an elective cesarean delivery had significantly more physical concerns, higher anxiety sensitivity scores, and higher postnatal PTSD symptom scores, than women who had vaginal or emergency cesarean deliveries. This study identified potential personality and childbirth factors, such as increased anxiety sensitivity, that may make women more likely to develop PTSD symptoms after childbirth, thus aiding researchers and medical professionals in identifying women who may be more vulnerable to traumatic responses in order to develop interventions targeted at protecting against these factors and lessening the traumatic response.

In a review of 19 articles, Olde and colleagues (2006) reviewed the prevalence and risk factors for the development of posttraumatic stress symptoms and PTSD after a successful childbirth. Of the studies, five were qualitative case studies, ten were quantitative, and four focused on emergency cesarean sections. Potential contributors the development of posttraumatic stress symptoms were identified throughout the case studies, and included the fear of losing or harming oneself or the baby, a lack of control, characteristics of the delivery (e.g. complications, emergency cesarean section, and insufficient pain relief), lack of support and information by staff, and a previous traumatic delivery experience. Quantitative studies identified some of the same contributors as case studies, such as the feeling of not being in control, level of obstetric intervention, perceived lack of support by staff and partner, and lack of information. Additional
contributing factors identified were perception of inadequate care and an internal locus of control. Six of these studies reported 2.8-5.6% of women met PTSD symptom criteria at six weeks postpartum, while two studies reported a decreased prevalence of around 1.5% at six months postpartum (Olde, van der Hart, Kleber, & van Son, 2006). However, these studies drew attention to the larger amount of women who may perceive the childbirth as being traumatic, as well as those who may develop some, but not all, posttraumatic stress symptoms. For example, a 2003 study by Soet, Brack, and Dilorio, found that 34% of the participants viewed the childbirth process as traumatic, while 30.1% of the sample developed partial posttraumatic stress symptoms.

Several studies by Ryding et al. (1997, 1998a, 1998b, as cited in Olde et al., 2006) on emergency cesarean sections were included in the review by Olde and colleagues (2006) and reported more posttraumatic stress symptoms for women who had an emergency cesarean section or instrumental vaginal delivery than women who had a normal vaginal delivery or an elective cesarean section (1998b). Furthermore, out of 25 women, 19 reported perceiving their emergency cesarean section as a traumatic experience; 13 of these women reported experiencing posttraumatic stress symptoms (1997, 1998a). Olde and colleagues discussed various methodological concerns as they pertained to prevalence rates (e.g. different instruments used to measure posttraumatic stress symptoms, differential time of measurements) and risk factors (e.g. differential findings for risk factors such as lack of social support, personality characteristics, and event characteristics). This review highlighted the need to interpret findings with caution, as the differential measurements may have a significant impact on the results. Furthermore, this review provided a helpful summary of potential factors that may contribute to the development of posttraumatic stress symptoms, which should be investigated more uniformly across studies.
Olde’s review of the emergency cesarean section studies by Ryding and colleagues supported the association between unexpected medical procedures and heightened stress reactions. A later study by Ryding, Wijma, and Wijma (2000) looked at 25 women who had undergone an emergency cesarean section in order to categorize their experiences and examine their posttraumatic intrusive stress reactions in a qualitative manner. After interviewing the women a few days after their procedure, and then another 1-2 months later, they were separated into four groups, which differed depending on the women’s expectations of and reactions to their delivery. The first group consisted of five women who remained confident and secure throughout the process, while the second group consisted of seven women whose positive expectations turned into disappointment when medical professionals decided an emergency cesarean section due to complications was medically necessary. The third group of women consisted of nine women who were fearful throughout the process, because they felt something was wrong; and the fourth group consisted of four women who were confused during the process and could not recall any events prior to seeing their baby. Results indicated that all of the women in the second group (positive expectations turned into disappointment) perceived their delivery as a mental trauma, and five of these women were in need of treatment for posttraumatic intrusive stress reactions at the 1-2 month follow-up. Similarly, all of the women in the third group (fearful throughout experience) perceived their delivery to be a mental trauma, and three of the women presented with symptoms of posttraumatic intrusive stress reactions at follow-up. While three of the four women in the fourth group (confused and lacked recollection of experience) identified their delivery as a mental trauma, none of them showed any posttraumatic intrusive stress reactions at the second interview. Although Maggioni, Margola, and Filippi (2006) did not identify a significant association between childbirth expectations and stress symptoms, this study
identified the importance of expectations as they pertain to the actual delivery experience, along with the ability to feel confident and secure throughout the process, in women who underwent emergency medical procedures during childbirth.

Various antenatal and perinatal factors can influence stress reactions after childbirth of full-term infants, as suggested by the previous studies. An important aspect of pregnancy and childbirth that has not yet been covered by these studies is the birth of high-risk and premature infants, which in itself can be an incredibly stressful event for the parents. As prevalence rates have suggested, mothers of medically fragile and/or premature (i.e., high-risk) infants may be at a greater risk of developing stress reactions after childbirth than mothers of low-risk full-term infants. Studies focusing on these infants may be especially useful in further identifying general aspects of the childbirth process that may affect all mothers, not just mothers of high-risk infants, as well as factors that may be unique to the parents of high-risk premature infants.

DeMier, Hynan, Harris, and Manniello (1996) conducted a study to examine the risk factors associated with the development of posttraumatic stress symptoms in mothers of high-risk infants. One hundred forty-two mothers answered a self-report questionnaire about their childbirth experience; 78 women reported on premature infants, 50 reported on healthy infants, and 14 reported on their infants who had been kept in the NICU after delivery. Results indicated a significant difference in the number of posttraumatic stress symptoms experienced by mothers, for example, mothers of high-risk infants (premature and NICU; mean number of symptoms = 6.9) had significantly more symptoms than mothers of healthy full-term infants (mean number of symptoms = 2.5). Of the perinatal stressors assessed, the Postnatal Complications Rating accounted for the most variance in posttraumatic stress symptoms (29.8%), followed by the gestational age of the baby (3%), and the length of stay in the hospital (2.2%), accounting for a
total of 35% of variance. These findings support the awareness of these potential risk factors, which can contribute to the development of posttraumatic stress symptoms after childbirth, especially for mothers of high-risk infants. Medical policies that take into account these potential risks may optimistically lessen the traumatic impact on mothers, as other supportive interventions may help as well. Once the potential risk factors for developing stress reactions are identified in mothers, establishing and effectively carrying out supportive interventions may serve a protective role against negative outcomes.

In addition to birthing a high-risk and premature infant, other serious medical complications may arise during the childbirth experience, such as preeclampsia and preterm premature rupture of membranes (PPROM). Stramrood and colleagues (2011) conducted a prospective study of women during and after their pregnancy in order to examine the prevalence of and risk factors for developing PTSD and depression after preeclampsia and PPROM. Participants were provided with questionnaires towards the end of their pregnancy, as well as 6 weeks and 15 months after labor. At the third check-in, there was a significant difference in the response rate between women who experienced preeclampsia (71%), PPROM (48%), and a normal delivery (95%). There was also a significant difference between groups for the prevalence of women meeting criteria for PTSD at the first check-in: 12% of the total sample met criteria for PTSD (21% of women who experienced preeclampsia, 14% who experienced PPROM, and 2% of women in the control condition). Seventeen women met criteria for PTSD at the second check-in, nine of whom also met criteria for depression; nine of the 17 women with PTSD participated in the third and final check-in, with two of them still meeting criteria for PTSD. Additionally, four new cases of PTSD were identified at the third check-in. Eleven percent of mothers with preeclampsia met criteria for PTSD at the third check-in, but the
response rate was too low for mothers with PPROM to make any conclusions. Results indicated that PTSD was significantly higher at the second and third check-ins for women in a patient group (preeclampsia or PPROM) than in the control group, while there was no significant difference between preeclampsia and PPROM groups. There was no significant difference found between groups for depression at any check-in.

Furthermore, the perinatal death of an infant was a significant predictor of the development of PTSD and depression, as prevalence rates were higher among the twelve women who lost their child than among women who did not. Removing these women from the analyses resulted in a drop in PTSD prevalence rates: rates for women who experienced preeclampsia dropped from 10.5% to 6% and rates for women who experienced PPROM decreased from 17% to 14.6%. There was no longer a significant difference in PTSD rates between the patient group (preeclampsia or PPROM) and control group at the second check-in; however, there was a significant difference between the PPROM group and control group at that time. Hierarchical linear regressions indicated that 39% of the variance for PTSD scores at the second check-in was accounted for by a high depression score at the first check-in, previous depressive episodes, and infant death. These three factors accounted for 44% of the variance in depressive scores at the second check-in. This study found a significant difference in symptoms of PTSD based on pregnancy and childbirth complications, with a decrease in rate of symptoms over time (Stramrood et al., 2011). This study also identified significant contributors to postnatal depression and PTSD, which can be helpful in identifying mothers who may be more at risk of developing depression or PTSD, and who may be likely to benefit from therapy.

Professionals have understood the great importance of interventions tailored to parents after childbirth, especially to parents of high-risk and premature infants. Brett, Staniszewska,
Newburn, Jones, and Taylor (2011) conducted a review of 72 studies focusing on interventions tailored to increase support and communication to parents of premature infants. The reviewed studies reflected a mix of randomized controlled trials, quasi-experimental designs, cohort studies, and non-intervention studies. Among the included intervention studies were those conducted during pregnancy, while on the neonatal unit, when preparing for discharge, or at home. These interventions focused on a variety of aspects of the medical care process and provided information before and during all stages of care, included parents in developmental and behavioral care programs, provided parent support groups and stress education, and prepared families for going home. Across these disparate interventions, the synthesized reviewed indicated beneficial effects from these interventions, such as increased knowledge and understanding about their infant, improved parent-infant interactions, reduced levels of stress and depression, and greater confidence in their own parenting skills. As childbirth can be a stressful and even traumatic experience for many families, especially parents of preterm infants, this study provided a helpful review of interventions that can alleviate many of the stresses and help parents feel informed, comfortable, and confident in their parenting abilities. Many of these interventions would be feasible to implement in a variety of medical care settings and could potentially lessen the traumatic impact on an abundance of families.

Stress reactions following childbirth occur in both mothers and fathers, and higher prevalence rates are shown in parents of high-risk and premature infants. In addition to the parents experiencing symptoms consistent with PTSD, more parents experience subsyndromal symptoms after childbirth. Antecedent factors, such as trait anxiety, and childbirth factors have been identified as potential risk factors for the development of stress reactions. Perceiving a lack of partner support, feelings of powerlessness, and increased medical interventions have been
associated with symptoms of stress following childbirth (Czarnocka & Slade, 2000; Soet et al., 2003). Moreover, level of obstetric intervention and unexpected medical interventions, such as an emergency cesarean section, have been associated with the development of acute trauma symptoms (Creedy, Shochet, & Horsfall, 2006). While these events may be experienced by any new mother, mothers of pre-term infants have been shown to have a significantly higher number of posttraumatic stress symptoms than mothers of healthy, full-term infants (DeMier, Hynan, Harris, & Manniello, 1996). Stress reactions are not the only outcome of a traumatic child birthing experience, however, as parents may also experience feelings of grief and depression. The current study focused first and foremost on anxiety reactions to childbirth, but a brief overview of prevalence rates, depressive reactions to childbirth, and associations with infant-attachment follows for the purpose of providing important context to the present study.

Depressive Reactions to Childbirth

A 1996 meta-analysis of 59 studies indicated an average postpartum depression rate (PPD) of 13% in mothers (O’Hara & Swain, 1996), while a longitudinal study reported a rate of 14% (Paulson, Dauber, & Leiferman, 2006). Studies of mothers of infants in the NICU have reported higher rates; for example, prevalence rates for the first month after infants were admitted into the NICU have been reported as 40% (Davis, Edwards, Mohay, & Wollin, 2003) and 39%, with an additional 16.9% of mothers meeting partial criteria (Lefkowitz, Baxt, & Evans, 2010). In another study, 39% of NICU mothers met PPD criteria, as compared to 22% of healthy, full-term infants (Vanderbilt, Bushley, Young, & Frank, 2009). Sixty-three percent of mothers whose infants were in the NICU were reported as being at risk for depression; their depression scores decreased over time and then remained stable after six months (Miles, Holditch-Davis, Schwartz, & Scher, 2007).
Fathers are also at risk of developing depressive symptoms, as was illustrated by a 2010 meta-analysis of 43 studies, in which an overall rate of PPD was found to be 10.4% in males, with even higher rates 3-6 months after childbirth (25.6%; Paulson & Bazemore, 2010). A similar rate was found off of the *Early Childhood Longitudinal Study*, in which 10% of males met criteria for clinical depression (Paulson, Dauber, & Leiferman, 2006). Elevated CES-D levels were found in fathers of premature NICU infants; initial rates were found to be 60%, which then decreased to 39% and then to 36% 35 days after childbirth (Mackley, Locke, Spear, & Joseph, 2010).

Due to the high prevalence rates of depressive symptoms following childbirth in both females and males, especially a traumatic or premature childbirth, researchers have taken a closer look at potential risk factors that may aid in the development of such negative mental health outcomes. For example, Davis, Edwards, Mohay, and Wollin (2003) surveyed 62 mothers one month after childbirth to assess the risk of depression after the birth of a very premature infant. Results indicated that 40.3% of mothers reported significant levels of depression on the Edinburgh Postpartum Depression Scale (EPDS). High level of maternal stress was the strongest predictor of postpartum depression symptoms: higher levels of stress were associated with an increased likelihood of depression. Additionally, perception of support from nurses and maternal education were significant predictors of depression, as lower education and lower perceived support were associated with a higher risk of depressive symptoms. This study highlighted the significant impact that perceived support, low levels of stress, and higher education can have on lessening the probability of developing depressive symptoms after a very premature birth. In addition to the development of depressive symptoms, reactions to childbirth can extend upon the symptoms felt by the individual and affect relationships with others, such as the infant.
Korja and colleagues (2011) investigated maternal attachment representations and postnatal depression in 38 first-time mothers of preterm infants and 45 first-time mothers of healthy full-term infants. All were provided with assessments measuring attachment representations, qualitative aspects of these representations, and depressive symptoms when infants were 6 months of age. Results did not indicate a significant difference between mothers of preterm and full-term infants in regards to attachment representations; rather, mothers were distributed similarly among balanced, disengaged, and distorted attachments in both groups. However, there were significant differences found among the qualitative aspects of these representations, as preterm mothers had significantly lower coherence and acceptance of their infants, and had higher levels of irrational fear about the safety of their infant, than mothers of full-term infants. Additionally, mothers with a distorted attachment representation of their infant showed higher levels of depression (i.e., had significantly higher scores on the Edinburgh Postnatal Depression Scale [EPDS]), than mothers with disengaged or balanced representations. However, these EPDS scores did not reach clinical levels for depression. Although mothers of pre-term infants are at no greater risk of having a disengaged or distorted attachment representation of their infants than mothers of full-term infants, this study suggested qualitative differences in the way some mothers of preterm and mothers of full-term infants viewed their infants.

Mother-infant interactions can also be influenced by unresolved feelings of grief stemming from childbirth. Shah, Clements, and Poehlmann (2011) examined the associations among grief resolution, mother-infant interactions, and infant attachment in 74 mothers of preterm infants. Maternal resolution for grief was assessed at 9 months after childbirth using the Reaction to Preterm Birth Interview (RPBI), and mothers were then identified as either having
resolved or unresolved grief. At this time researchers also identified the quality of mother-infant interactions by use of the Parent-Child Early Relational Assessment (PCERA). Infant attachment styles were examined at 16 months by use of the Strange Situation Procedure test; half of the infants had secure attachments while the other half had insecure attachment styles (30% insecure-avoidant, 19% insecure-resistant, 1% disorganized). Results indicated that 67.6% of mothers had resolved grief about their preterm childbirth; these mothers were shown to be 2.9 times more likely to have secure attachments with their infants than mothers who had unresolved grief. Furthermore, the relative risk of insecure infant attachment for mothers with unresolved grief was reported to be 1.59. Mother-infant interaction quality was not shown to have a mediating role between maternal grief resolution and infant attachment style; however, it was a significant predictor of attachment style. Better parenting, which was evidenced by a positive affect, along with responsive and sensitive behaviors, significantly increased the likelihood of a secure infant attachment. These findings by Shah and colleagues demonstrated the potentially harmful effects unresolved maternal grief and poor mother-infant interaction can have on an infant’s attachment style.

Clearly, childbirth can cause significant distress in mothers and fathers, resulting in symptoms of anxiety, depression, and grief. Furthermore, these symptoms may be exacerbated by aspects of the childbirth, and may affect later attachment and interactions between the mother and child. As these reactions can cause significant disruptions in the daily life and relationships of those experiencing them, it is crucial to identify potential factors that may place one at a greater risk for such outcomes. The identification of these potential risk factors may enable medical professionals to better identify individuals who may be well suited for mental health treatment, allowing for quicker interventions. Although little research has been conducted on
vulnerabilities to the development of stress reactions to childbirth, a plethora of studies are available in the broader trauma literature. These studies may aid us in understanding variables that may make an individual more vulnerable to the development of stress reactions following childbirth, and will therefore be reviewed, as the findings from the trauma literature motivate our aims for the current study.

Risk Factors: Individual Variables

A variety of variables have been examined and identified as potential risk factors for the development of stress reactions and negative mental health outcomes following exposure to traumatic events. One such variable, type of trauma experienced, was examined by Green and colleagues (2000) in order to identify the relations among trauma exposure and negative mental health outcomes. In this study, 2,507 female college sophomore students were surveyed in the Washington, D.C. area. Participants were divided into groups based on occurrence of trauma exposure (no exposure, one type of event exposure, or multiple event exposures) and were provided with questionnaires assessing dysphoric mood, traumatic stress, and self-regulation. Excluding participants who only reported a “non-criterion A” event, 65% of the sample reported experiencing at least one traumatic event; of these individuals, only 9-21% indicated that it was only traumatic event they had experienced. Participants were also surveyed on the type of trauma event they experienced, such as an interpersonal trauma or non-interpersonal trauma, and were thus divided into six subgroups (no trauma, “non-criterion A” trauma, one non-interpersonal trauma, one interpersonal trauma, ongoing interpersonal trauma, and multiple interpersonal traumas; 1,909 women fit into these categories).

Results indicated that multiple interpersonal traumas had the highest overall risk for negative mental health outcomes, as it was significantly higher than every other subgroup.
Individuals in each subgroup, excluding those who experienced non-interpersonal trauma, had significantly higher risk for negative mental health outcomes than those who had not been exposed to a trauma. Additionally, researchers found that individuals who had experienced interpersonal trauma suffered from greater distress than individuals who experienced non-interpersonal trauma. Similarly, participants who had experienced a single “non-criterion A” event had higher scores for traumatic stress than those who had experienced a single non-interpersonal trauma. There was not a significant difference among scores for single and ongoing interpersonal subgroups; however, the single interpersonal subgroup had higher scores on traumatic stress and self-regulation than individuals in the single non-interpersonal trauma subgroup. While many trauma studies focus only on a target event, Green and colleagues provide strong empirical support for the necessity of assessing full trauma histories, as accounting for the related effects can lessen the potential of confounded studies and can provide more accurate information needed for the effective assessment and treatment of traumas.

Brewin, Andrews, and Valentine (2000) investigated other variables, in addition to type of trauma, in order to further examine risk factors for PTSD and the homogeneity of their effect sizes across studies with a meta-analysis of 77 studies of adult trauma and PTSD risk factors. Six study and sample characteristics (such as military vs. civilian trauma, gender of participants, and interview vs. questionnaire format) were studied to investigate their effect on fourteen PTSD risk factors (such as gender, age at trauma, and post-trauma social support). Researchers combined effect sizes for risk factors from each study; all risk factors were significant, while greater trauma severity, lack of post-trauma social support, and higher post-trauma life stress were the strongest predictors.
When investigating the effects of study and sample characteristics, Brewin and colleagues (2000) found that some predictors were significant only in some populations, while others consistently predicted PTSD among all populations but to varying extents, and still others had homogeneous effects in predicting PTSD among all populations. Across studies, only psychiatric history, childhood abuse, and family psychiatric history had homogeneous effects, while female gender, younger age at time of trauma, and minority status had predictive effects in certain populations. The remaining eight risk factors, which pertained to demographic factors (SES, intelligence, and education), other trauma experiences (previous trauma and adverse childhood), trauma severity, and post-trauma variables (lack of social support and life stress) consistently predicted PTSD among studies but to varying degrees. This study provides pertinent information regarding risk factors that play a significant role in predicting PTSD symptomatology, as well as the study and sample characteristics that can influence the effect of these predictors. Therefore, the authors suggest that it is important to distinguish between these characteristics when assessing and treating PTSD and its associated risk factors.

In addition to risk factors that may be able to predict the magnitude of stress reactions or negative mental health outcomes following exposure to a stressor, variables may also play a moderating role between the exposure and outcome. For example, Ozer and colleagues conducted a meta-analysis of 68 studies investigating predictors of PTSD and symptoms in adults, as well as potential moderating variables (Ozer, Best, Lipsey, 2003). Predictors assessed included pre-trauma variables (prior psychological adjustment, family history of psychopathology), prior traumatic events, trauma-specific variables (perceived life threat during the trauma, peritraumatic emotional responses, peritraumatic dissociation), and post-trauma social support. Results indicated that all predictors were significant, while peritraumatic
dissociation had the strongest effect size (.35), followed by post-trauma social support (-.28), peritraumatic emotional response (.26), and perceived life threat (.26). History of prior trauma, prior psychological adjustment, and family history of psychopathology had the lowest effect sizes (.17 each).

Additionally, researchers investigated the moderating effects of variables such as type of event, time elapsed since event, type of sample, and method of assessment. Moderator variables had differential effects on particular variables; for example, there was a stronger correlation between perceived life threat and PTSD rates/symptoms when more time had elapsed since the trauma, and when the trauma involved noncombat interpersonal violence than when it involved an accident. While many studies focus on pre-trauma variables, such as family history of psychopathology, these results highlight the crucial role peritraumatic psychological processes, such as peritraumatic dissociation and emotional response, can play in increasing the risk for development of negative mental health outcomes after exposure to trauma. Further understanding of these processes can aid researchers in developing treatments designed to buffer these negative effects after experiencing a trauma.

Various aspects of the trauma, such as interpersonal or non-interpersonal, severity of trauma, and trauma occurrence, such as a single or repeated occurrence, can significantly affect the risk for the development of significant post-trauma distress (Green et al., 2000). Processes during the trauma, such as dissociation and emotional response, as well as post-trauma variables, can have a significant impact on the development and severity of distress (Brewin et al., 2000; Ozer et al., 2003). Post-trauma variables, such as social support and post-trauma life stress, can help or hinder the coping abilities of individuals after experiencing a trauma, and may predict difficulties in effectively coping. Furthermore, pre-trauma variables, such as the occurrence of
previous traumatic experiences and prior psychological adjustment, have also been identified as risk factors (Ozer et al., 2003). While aspects of the trauma both during and after the event, in addition to pre-trauma variables, may aid professionals in identifying individuals who may be more at risk for developing negative mental health outcomes, other predictors play a key role as well. In addition to trauma variables, personality variables unique to each individual may also increase the risk for a stress reaction following trauma.

**Risk Factors: Personality Variables**

Lauterbach and Vrana (2001) examined the relationship between personality variables (antisocial, borderline, neuroticism, and introversion) and demographic variables (sex of participant) on the number of traumatic events experienced and the severity of posttraumatic stress symptoms in a non-clinical sample of 402 undergraduate students. Results indicated that participants with higher antisocial traits were more likely to experience multiple traumas, as were participants with higher borderline traits. Furthermore, researchers discovered a differential effect between borderline traits and sex of the participant; for example, borderline traits had a stronger correlation with trauma exposure for males than for females. Additionally, trauma intensity and number of traumatic events each had a significant positive correlation with severity of posttraumatic stress symptoms, and accounted for 31% of its variance. Neuroticism and a neuroticism x trauma intensity interaction accounted for the remaining 12% of variance, as there was a strong correlation between trauma intensity and posttraumatic stress symptoms for individuals high in neuroticism, while this relationship was only marginal for individuals low in neuroticism. Lauterbach and Vrana (2001) highlight personality and trauma variables, along with their interactions, that may serve as strong predictors for experiencing multiple traumas and the severity of their resulting posttraumatic stress symptoms. Neuroticism, for example, was
indicated as a risk factor for negative outcomes following trauma; additional research has looked in depth at the predictive role of neuroticism following exposure to a traumatic event.

Borja, Callahan, and Rambo (2009) surveyed 86 college students who had experienced either a natural disaster or a sexual assault in order to look at the effects of neuroticism and social support on post-trauma outcomes. Results indicated that neuroticism was significantly associated with negative outcome variables in both trauma subgroups, except for PTSD symptoms in the natural disaster subgroup, while social support was not significantly associated with any outcome variables in either sample. Furthermore, researchers discovered a significant interaction between neuroticism and social support for PTSD symptoms in the natural disaster subgroup, as individuals with lower perceived social support had lower levels of PTSD symptoms, while individuals who had higher perceived levels of social support and neuroticism had the highest levels of PTSD symptoms. Additionally, social support had a differential effect on depression in the sexual assault subgroup, dependent on level of neuroticism: individuals high in neuroticism and social support had the highest levels of depression, while individuals low in neuroticism and high in social support had the lowest levels of depression. This finding provides an empirical look at the significant predictive effect of neuroticism on negative post-trauma outcomes, and the potential of moderating variables such as social support to lessen or exacerbate this relationship.

Engelhard, van den Hout, and Kindt (2003), in a prospective study of 1,370 pregnant women, examined the role of neuroticism and its association to stress reactions following trauma, as well as to pre-trauma arousal symptoms. One hundred eighteen of these women experienced pregnancy loss and were included in analyses as the sole focus of the study. Results indicate a significant increase in arousal symptoms after the pregnancy loss, as well as a significant correlation between neuroticism and pre-trauma arousal symptoms. Additionally,
neuroticism was significantly related to post-trauma PTSD symptoms; more specifically, neuroticism had a strong correlation with PTSD arousal symptoms, a moderate correlation with PTSD avoidance and numbing symptoms, and a non-significant correlation with PTSD re-experiencing symptoms. However, after controlling for pre-trauma arousal, neuroticism was no longer significantly associated with post-trauma PTSD arousal or avoidance symptoms, indicating that neuroticism did not have a significant role in the increase of arousal symptoms after the pregnancy loss. These findings suggest that neuroticism may contribute to a high baseline of arousal symptoms, but other factors, such as those pertaining to the specific trauma, may play a more powerful role in the development of PTSD symptoms.

In addition to personality factors playing a potentially predictive role in the development of stress reactions following trauma, these factors may also influence the expression of the stress reactions. For example, Miller (2003) reviewed numerous studies detailing predictive personality factors and PTSD in order to examine the influence of three personality factors on the development and expression of PTSD. These personality factors were Negative Emotionality (NEM; such as neuroticism), Positive Emotionality (PEM; such as extraversion), and Constraint/Inhibition (CON). Results in four prospective military studies reviewed indicated a significant correlation between pre-trauma levels of NEM and the post-trauma development of PTSD, while two identified CON as an additional potential risk factor. However, these four studies contained all-male military personnel. Consequently, there may be difficulty generalizing these findings to female populations or other types of trauma. Miller identified seven post-trauma prospective studies; these studies examined personality traits and PTSD symptoms shortly after the traumatic incident in order to see their ability to predict PTSD symptoms months later. These studies showed a significant correlation between high NEM and low CON, as well as low PEM,
in the development and expression of PTSD. For example, a study of 70 burn patients illustrated a significant predictive relationship between levels of neuroticism and introversion immediately after the trauma to levels of PTSD symptoms four and twelve months later. Another study of military personnel identified introversion, but not neuroticism, assessed two weeks after the trauma, as a significant predictor of PTSD symptoms three months later. These post-trauma prospective studies contained a more diverse sample of individuals and trauma events, as many included women; these studies also included multidimensional personality assessments.

Cross-sectional studies were also examined in Miller’s review, and many identified neuroticism (NEM) as a significant predictor of chronic PTSD among various trauma samples. These studies indicated significant relations among high NEM and low PEM in the development of PTSD. Hardiness, which has been described by some studies as being represented by high PEM and low NEM, was investigated in several of these studies. In a study with Gulf War veterans, high levels of hardiness were significantly related to less PTSD symptoms; this effect was increased in individuals who had been exposed to higher levels of combat. One model identified in Miller’s review identifies NEM as the main personality risk factor for the development of PTSD, and identifies PEM and CON as moderating variables that influence the expression of PTSD. For example, individuals with high NEM and low PEM are more likely to have an internalizing form of the disorder, marked by depressive, anxious, and obsessive-compulsive symptoms. On the other hand, individuals with high PEM and low CON are more likely to have an externalizing form of the disorder, marked by aggressive, impulsive, and antisocial symptoms, along with an increased risk for substance-abuse. This study identified not only risk factors that make an individual more vulnerable to the development of PTSD after a
trauma, but personality factors that may make an individual more susceptible to a particular expression of the disorder.

Personality variables can exert a significant influence on individuals after a traumatic experience, and either aid the individual in health and effective coping, or in the development of stress reactions. Neuroticism has been investigated as a risk factor by numerous researchers, and its predictive ability in the development of stress reactions has been supported by several studies (Borja et al., 2009; Lauterbach and Vrana, 2001; Miller, 2003). Furthermore, Borja and colleagues (2009) identified the differential effect of social support after a traumatic experience, dependent upon an individual’s levels of neuroticism, while Engelhard, van den Hout, and Kindt (2003) highlighted the association between neuroticism and pre-trauma arousal levels in a sample of women who experienced pregnancy loss. In addition to neuroticism, or negative emotionality, Miller’s (2003) review identified the roles that other personality factors, such as positive emotionality and inhibition can have in regards to the development and expression of stress reactions following a traumatic experience.

Lasting Effects of Maternal Psychological Distress

Maternal anxiety and stress reactions not only affect the individual experiencing them, but can also have significant and lasting effects on their children. Studies have supported the duration of these effects as lasting throughout infancy and childhood. For example, Lundy and colleagues (1999) investigated the effects of prenatal depression on newborns by conducting a study with 25 depressed and 18 non-depressed mothers. Mothers were assessed late in pregnancy for depression and provided urine samples to test levels of cortisol, norepinephrine, epinephrine, and dopamine; infants completed the Brazelton Neonatal Behavioral Assessment and provided a urine sample within 24 hours of birth. Urinalysis identified significantly higher prenatal levels of
cortisol and epinephrine, and lower levels of dopamine in depressed mothers than non-depressed mothers. Infants of depressed mothers mirrored these results and had significantly poorer performance on the orientation, reflex, excitability, and withdrawal clusters of the Brazelton Assessment. Results indicated that both maternal prenatal depression scores and norepinephrine levels predicted newborn orientation scores, while maternal prenatal cortisol levels were significantly associated with abnormal newborn reflexes. Maternal prenatal norepinephrine levels and trait anxiety were found to be predictive of infant norepinephrine levels. Furthermore, maternal depression predicted epinephrine and cortisol levels in infants, while maternal prenatal dopamine levels predicted dopamine levels in infants. Although many studies report on the effects early interactions may have on infants, this study attests to the significant predictive role biochemical factors may have on their development.

In addition to potential biochemical changes in infants, maternal depression can affect an assortment of other areas, including infant affect and electroencephalogram (EEG) activity. Jones, Field, Fox, Davalos, and Gomez (2001) conducted a study investigating EEG asymmetries in infants of depressed mothers. Participants were 38 mothers, 18 of whom met criteria for depression, and their 10-month-old infants. Infant EEG activity and affect were monitored during a baseline condition, while watching videos designed to elicit positive and negative emotions, during a play interaction with their mother, and during a stranger situation. Results indicate that infants of depressed mothers displayed more negative affect during sad films, the mother-infant play interaction, and during maternal separation, while depressed mothers showed more negative affect and less positive affect during the play interaction than non-depressed mothers. Furthermore, infants of depressed mothers were recorded having greater relative right frontal EEG asymmetry during baseline, happy condition, mother-infant play interaction, and in the
stranger condition, than infants of non-depressed mothers. These infants also showed less left frontal EEG activation, or more left frontal EEG power, during the mother-infant play interaction and during the stranger condition. Significant differences were highlighted among infants of depressed and non-depressed mothers, as infants of depressed mothers showed more negative affect, less positive affect, and more relative right frontal EEG activation, all of which have been thought to be associated with depressive symptoms.

Diego, Field, Jones, and Hernandez-Reif (2006) further examined the relationship among maternal depression and infant frontal EEG asymmetry shifts, in combination with maternal interaction style. Soon after childbirth, 38 depressed mothers and 28 non-depressed mothers were assessed for their behavior to rewards and punishments, by use of the Behavioral Inhibition and Behavioral Approach System Questionnaire (BIS/BAS), and for depression, while infants were given an EEG. Mothers and infants were assessed a second time when infants were 3-6 months old; at this time the infant’s EEG activity was recorded once again, mothers were videotaped interacting with their child and their interaction styles were coded as intrusive, withdrawn, or undefined. Results indicated that infants of depressed mothers had significantly greater relative right frontal EEG asymmetry than infants of non-depressed mothers at both assessment periods. Of infants with depressed mothers, infants with withdrawn-depressed mothers had a greater shift towards relative right frontal EEG activation from the first to second assessment, while infants with intrusive-depressed mothers had a greater shift towards relative left frontal EEG activation. Thirty-one percent of the variance in the frontal EEG asymmetry shift from the first to second assessment was accounted for by maternal BAS/BIS difference scores and the amount of time that had elapsed between assessments. Maternal BAS/BIS difference scores were inversely related to the shift in frontal EEG asymmetry, as lower scores predicted greater shifts, while the
amount of time elapsed between assessments was positively associated with the asymmetry shift, as greater shifts were associated with greater time lapses. These studies identified the predictive role maternal depression and interaction style can have on an infant’s biochemical levels, affect, and frontal EEG activity as a short-term effects. Some effects, however, can last much longer than infancy and may span out into adolescence and adulthood.

Loomans, van der Stelt, van Eijsden, Gemke, Vrijkotte, and Van den Bergh (2012) conducted a prospective longitudinal study investigating the association between antenatal maternal anxiety and the cognitive functioning of their children at the age of five. Participants were part of a larger study, the Amsterdam Born Children and their Development (ABCD) study, which examined psychosocial and lifestyle factors during pregnancy and their associations with the later health and development of their child. Nine hundred twenty-two women were included in this study and were provided with the Dutch version of the state-anxiety subscale of the State-Trait Anxiety Inventory (STAI) at their 16th week of pregnancy. Children’s cognitive functioning was measured at the age of five years old, and was assessed using the Amsterdam Neuropsychological Tasks (ANT), which is a computerized assessment that measures information-processing and attention. Children were provided with two tasks – a simple reaction time (RT) task, and a choice RT task. The choice RT task had two parts: a compatible task, and an incompatible task, which had directions opposing the directions provided for the compatible task.

Results indicated a significant positive association between antenatal maternal anxiety and the intra-individual variability in RT in the simple RT tasks; more specifically, higher levels of antenatal maternal anxiety were associated with greater variability. However, this association accounted for a small amount of variance in cognitive functioning, as only 1% of the variance in
the intra-individual variability was explained. Furthermore, when using a subsample of mothers whose state-anxiety was above 90% of the sample, significant associations were found between antenatal maternal anxiety and the mean RT (overall performance) and intra-individual variability in RT (inconsistency in performance across trials) in the incompatible trials of the choice RT task. As anxiety increased, it was associated with longer mean RTs and greater variability in RTs. In addition, the child’s sex was found to have a moderating role between antenatal maternal anxiety and intra-individual variability on the simple RT tasks, as the association was significant in males, but not females. This study supports the influence that high levels of maternal stress during pregnancy may have on the developing child, not only in infancy but through early childhood as well.

Other studies have shown effects of maternal anxiety on children older than five years old. For example, Buss, Davis, Hobel, and Sandman (2011) looked at pregnancy-specific anxiety, state anxiety, and depression in a sample of 89 mothers. Anxiety measures were taken 5 times throughout pregnancy, while depression scores were taken both during pregnancy and concurrently with the child assessments. Executive functioning of their children was measured when the children were between the ages of 6 and 9; the Flanker task was used to measure inhibitory control, while a sequential memory task was used as a measurement of visuospatial sequence capacities in working memory. Analyses indicated significant effects of pregnancy-specific anxiety on children’s executive functioning: higher levels of pregnancy-specific anxiety was associated with poorer visuospatial performance on the sequential memory task in both males and females, as well as poorer performance on the inhibitory control task in females. Higher levels of depression and state anxiety were also associated with poorer performance on the visuospatial working memory task; however, these variables did not add any additional
variance after pregnancy-specific anxiety had been included. Loomans and colleagues (2012) and Buss and colleagues (2011) have indicated effects of maternal anxiety on cognitive and executive functioning in offspring that last into childhood.

In addition to cognitive functioning, maternal anxiety may also influence hypothalamic-pituitary-adrenal (HPA) axis functioning in offspring during childhood. For example, O’Connor, Ben-Shlomo, Heron, Golding, Adams, and Glover (2005) examined the relationship among prenatal stress and HPA axis functioning in a sample of 74 10 year olds, by collecting diurnal cortisol samples four times a day for three consecutive days. Maternal anxiety was measured twice during pregnancy and 3 times after childbirth with the anxiety items of the Crown-Crisp index. In addition, maternal depression was assessed with the Edinburgh Postnatal Depression Scale (EPDS). Analysis results indicated a significant positive association between prenatal anxiety and cortisol levels upon awakening, as well as with levels of cortisol in the afternoon. More specifically, prenatal anxiety at week 32 of pregnancy maintained a significant association with cortisol levels upon awakening, even after other anxiety and depression measures had been included. However, the relationship among prenatal anxiety and afternoon cortisol level was no longer significant after accounting for other anxiety and depression measures. O’Connor and colleagues’ findings support the association between prenatal anxiety and higher baseline cortisol levels, which have been suggested as a potential risk for psychosocial and psychological difficulties (Goodyer, Herbert, Altham, Pearson, Secher, & Shiers, 1996; Harris et al., 2000).

Although there is a scarcity of studies linking exposure to anxiety during pregnancy and infancy to effects in adulthood, researchers have investigated the long-term effects of early exposure to maternal depression. Exposure during infancy to maternal postnatal depression has been found to result in significant and lasting effects on emotional and physiological processes in
early adulthood. For example, Douglas and Harmer (2011) explored the relationship between exposure to postnatal depression (PND) during infancy and later emotional processing and cortisol levels in early adulthood. Eleven undergraduate students whose mothers experienced PND were matched with fifteen students who were not exposed to PND on levels such as age, gender, mood, and verbal IQ. Participants completed an emotional categorization task and provided morning cortisol samples to researchers. Participants who had been exposed to PND in infancy had higher cortisol levels, and were slower at emotional categorization tasks, than participants in the control group. These results highlight the importance of further evaluating these relationships and obtaining early treatment for PND in order to limit lasting potential for deleterious effects.

Fortunately, the findings reported by Douglas and Harner (2011) do not represent a predestined fate for infants exposed to maternal postnatal depression. Poobalan and colleagues (2007) systematically reviewed eight studies of PND treatment in order to assess the beneficial effects treating postnatal depression has on a child’s development and the mother-infant relationship. Of these eight studies, one focused on the child’s cognitive development, two focused on both the child’s cognitive development and the mother-infant relationship, and the remaining five studies focused solely on the relationship between the mother and infant. Results from the single cognitive development study displayed significant improvement in the child’s cognitive development, specifically verbal IQ, after an intensive, long-duration treatment. The two studies focusing on both cognitive development and the mother-infant relationship did not show significant improvement in cognitive development, but, along with the remaining five studies, did show significant improvement in the mother-infant relationship after treatment. As PND has been shown to have harmful effects on infants, this study identified characteristics of
treatments that can potentially lessen these negative effects and strengthen cognitive and social development. With potentially efficacious treatments available it becomes important that parents in distress be identified and referred to appropriate services.

The Present Study

In addition to examining the prevalence and predictors of stress and depressive reactions to childbirth, the current study sought to investigate the utility of expressive writing interventions in lessening the severity of posttraumatic stress after childbirth. Effect of the intervention was assessed using three measures: the Outcome Questionnaire 45.2 (OQ 45.2), the Perinatal Posttraumatic Stress Disorder Questionnaire (PPQ), and the Subjective Well-Being (SWB) measure. It was hypothesized that participants in the experimental condition will experience a significant decrease in negative emotion (e.g. lower scores on the PPQ and the OQ 45.2) and an increase in positive emotion (e.g. higher scores on the SWB) by the time of the fourth survey, after partaking in both expressive writing sessions. In addition to intra-group changes in the experimental group following both writing sessions, it was hypothesized that the experimental group would portray more positive mental health outcomes than participants in the active control group, as they were not exposed to the expressive writing intervention.

The final aim of the study focused on the validation of the Perinatal Posttraumatic Stress Disorder Questionnaire. This measure was used to assess posttraumatic stress reactions to childbirth, and has been utilized in prior studies with new parents. This measure evaluated the intrusion/re-experiencing symptoms, avoidance behaviors, and hyperarousal/numbing symptoms inherent in PTSD (Callahan, Borja, & Hynan, 2006). This measure was hypothesized to correlate more strongly with convergent measures (e.g., measures assessing posttraumatic distress symptoms) than discriminant measures (e.g., perceived benefits, family coping style).
CHAPTER II

METHODS

Participants

Participants were expectant parents between 8 and 42 weeks gestation, recruited from Amazon’s Mechanical Turk (MTurk; www.MTurk.com); an online website where participants can be recruited to participate in research activities. Buhrmester, Kwang, and Gosling (2011) investigated the utility of MTurk for data collection and found that recruitment samples were more demographically diverse than typical samples from the Internet or from colleges, were as reliable as traditional research samples, and provided responses that were of adequate quality. Although MTurk can recruit participants from other countries, only expectant mothers and fathers in the United States were recruited for this study. In order for individuals to be eligible to participate, they must have (1) been an expectant parent at 8-42 weeks gestation, (2) had the authority to make medical decisions, (3) and read English or Spanish. Individuals unable to meet these requirements were excluded from the study.

Procedures

Four surveys were given to participants at four different time periods during the study: the baseline measure was given during pregnancy through the use of MTurk; the second measure was given within a week after childbirth; the third survey was given approximately six weeks after childbirth; and the final survey was given approximately nine weeks after childbirth (see Table 1 and Table 2 for an outline of procedures and their timing for each group). Participants were provided $1 for completing the initial survey. In addition, participants were provided with a small compensation (care package) after completion of the second survey, and were entered to
win a $300 gift card after the completion of the third survey. Participants were also entered to win another $300 gift card after completion of the fourth survey.

Detailed study information was provided to participants prior to the commencement of the surveys, and participants were asked to provide their informed consent. All study materials were kept strictly confidential. Participants were assigned a study identification number; a separate document linking participant information and number was kept in a secured location but not combined with the data set used in analyses. Data was transferred from online databases (e.g., Qualtrics website; www.qualtrics.com) to a single data spreadsheet; online surveys were then deleted in order to maintain confidentiality. The electronic database will be retained for a minimum of three years after study conclusion.

Expressive Writing

Studies have examined the use of expressive writing after a multitude of diverse events, in terms of both type of event and severity. For example, studies have examined the effect of expressive writing following terrorist attacks (Fernández & Páez, 2008), cancer (Craft, Davis, & Paulson, 2013; Merz, Fox, & Malcarne, 2014), childhood sexual abuse (Meston, Lorenz, & Stephenson, 2013), and even among adolescents transitioning to high school (Facchin, Margola, Molgora, & Revenson, 2014) as well as many other events. Studies have found a mixture in expressive writing results, and have emphasized the focus on when and for whom expressive writing works. Systematic reviews have largely focused on examining various moderators and variables otherwise influencing the utility of expressive writing interventions (Smyth, 1998; Frattaroli, 2006; Smyth & Pennebaker, 2008).

In the current study, participants were randomly assigned into one of two study arms for the second and third surveys: the expressive writing condition and the active control condition.
Participants in the expressive writing condition were asked to focus on the positive aspects of their child’s birth in a writing activity, such as focusing on the ways they have grown due to the experience. Participants were encouraged not to worry about grammar or punctuation, but instead asked to focus on the positive aspects of the event. Participants in the active control group were asked to write about a neutral topic, specifically, about the shoes they were wearing while completing the survey.

After writing, participants in both groups were asked to indicate how upsetting, emotional, difficult, and important the information was that they were writing about. Responses were provided on a 6-point Likert-style format from 1 (Not at All) to 6 (Extremely Much). Participants were also asked to record the number of minutes they spent writing in each session. A study with Hispanic undergraduates demonstrated significant decreases in psychological symptoms in two online expressive writing conditions focused on a traumatic experience (fact-focused writing or emotion-focused writing), although both groups experienced increased negative affect immediately after completing each writing exercise. Furthermore, the emotion-focused writing group had significantly lower psychological symptoms associated with the trauma at the 5-week follow-up (Hirai, Skidmore, Clum, & Dolma, 2012).

A study by King and Miner (2000) focused on the health effects of writing about the perceived benefits of traumatic events. Participants were divided into four conditions: writing about the trauma, the perceived benefits of the trauma, the trauma and the perceived benefits of that trauma, and a control condition. Participants were asked to write for twenty minutes, three days in a row, with positive and negative affect rated immediately after each writing session. Participants who wrote about a trauma reported significantly less positive affect after the writing session; however, there was not a significant increase in negative affect. When examining the
content of the essays in each condition, the essays in the perceived benefits only group included more positive emotion words and insight words than essays from the other conditions, and were rated as being more positive. Analysis results indicated that all three of the expressive writing experimental conditions participants (trauma, perceived benefits, combination) visited the health center a significantly lower amount of times three months after the expressive writing intervention than participants in the control condition. Furthermore, participants in the trauma and perceived benefits conditions maintained a significantly lower health center visitation rate than participants in the control condition; at this time, participants in the combination group no longer differed significantly from the control condition. Regression equations indicated that the increased use of terms relating to cognitive insight in the perceived benefits group was associated with the health benefits experienced by this group; the authors suggested that these benefits may be attributable to self-regulating abilities, as the ability to regulate emotions after a trauma has been implicated as an important tool for trauma recovery.

Boals (2012) investigated the role of meaning making in the effectiveness of expressive writing interventions in a sample of college students. Results indicated that effectiveness of writing (as measured by fewer intrusive thoughts) differed based on the type of meaning making that was assessed (e.g., judged by a researcher or use of cognitive words) and the level of distress associated with the event. When meaning making was assessed by judges, as meaning making increased for individuals writing about highly stressful events, the amount of intrusive thoughts lessened. The opposite pattern was seen with individuals writing about events that were less stressful; as meaning making increased, the number of intrusive thoughts also increased. When the use of cognitive words was utilized as the measurement of meaning making, individuals writing about highly stressful events experienced a similar decrease in intrusive thoughts, while
individuals writing about less stressful events did not experience a significant change in their intrusive thoughts. Boals’ (2012) research provides another avenue for investigation into when, for whom, and how expressive writing may be beneficial for individuals.

Expressive writing in a self-administered format at home may be a good fit for many new parents, given the high demands on their time after childbirth. In addition to the availability and feasibility of at-home writing, participants may also feel more comfortable and be awarded more privacy in such situations. These two components, at home settings (as opposed to lab settings) and privacy (compared with writing with others in a public room), have previously been shown to have a significant impact on the effect size in expressive writing studies (psychological health effect size for setting, psychological health effect size and overall effect size for privacy, Frattaroli, 2006).

Measures

Demographics

Participants were provided with a self-report demographic questionnaire during the baseline measure, which asked questions about participant’s age, marital status, occupation, education level, and socioeconomic status. Preferred language and parity were identified by self-report.

Family Crisis Oriented Personal Evaluation Scales (F-COPES)

The Family Crisis Oriented Personal Evaluation Scales (F-COPES) is a 30-item self-response measure assessing the problem-solving and behavioral strategies used by families when faced with difficult situations (McCubbin, Olson, & Larsen, 1991). Participants are provided with 5-point Likert-type response scales to report their level of agreement (“Strongly Disagree” to “Strongly Agree”) to statements such as “When we face problems or difficulties in our family,
we respond by knowing we have the power to solve major problems” and “…seeking encouragement and support from friends.” The scale provides a total score as well as scores for five subscales: Acquiring Social Support, Reframing, Seeking Spiritual Support, Mobilizing Family to Acquire and Accept Help, and Passive Appraisal. This measurement has demonstrated strong internal consistency for the total scale (α = sample 1: .86, sample 2: .87, combined samples: .86) and adequate to strong internal consistency for subscales (α = sample 1: .64-1.84; sample 2: .62-.83; combined samples: .63-.83), as well as strong test-retest reliability (α = .81; McCubbin, Olson, & Larsen, 1991).

Internal consistency ranged from adequate to strong for many of the scales at the baseline (e.g., during pregnancy; α = total scale: .81, acquiring social support subscale: .80, seeking spiritual support subscale: .93, mobilizing family subscale: .62, reframing subscale: .77, passive appraisal subscale: .63), after birth (α = total scale: .84, acquiring social support subscale: .87, seeking spiritual support subscale: .91, mobilizing family subscale: .58, reframing subscale: .75, passive appraisal subscale: .68), and 6 weeks after birth (α = total scale: .87, acquiring social support subscale: .88, seeking spiritual support subscale: .92, mobilizing family subscale: .75, reframing subscale: .84, passive appraisal subscale: .63) time points, with the exception of the mobilizing family and passive appraisal subscales. Further evaluation of the mobilizing family subscale (survey 1: pregnancy; survey 2: post-birth) and passive appraisal subscale (survey 1: pregnancy; survey 2: post-birth; survey 3: 6-week follow-up) was conducted due to the inadequate internal consistencies of these subscales. Item analysis of each scale indicated that removal of any items from the mobilizing family subscale at both pregnancy (survey 1) and post-birth (survey 2) would not result in a stronger scale; therefore, these subscales were not altered. Consequently, they were not used in any subsequent analyses. Similarly, item analysis of the
passive appraisal subscale indicated that removal of any items weakened the scale (survey 1 and survey 2) or did not improve the scale enough to reach an adequate alpha level (survey 3); therefore, these scales were also excluded from analyses.

Infant Birth Data

Data pertaining to the infant’s birth was collected immediately after delivery. This included the infant’s gender, gestational age, birth weight, type of delivery (vaginal or cesarean), infant survival, and length of infant’s hospitalization. In addition, a Postnatal Infant Complications Rating was requested for each infant. The rating is an 8-point scale assessing severity on a scale of 0 (no complications) to 7 (severe complications, such as grade IV intraventricular hemorrhage; Callahan, Borja, & Hynan, 2006).

Outcome Questionnaire 45.2 (OQ 45.2)

The OQ 45.2 is a 45-item self-report questionnaire that asks for the respondent to describe their feelings over the past week by responding to questions with one of five categorical ratings (e.g. “never” to “almost always”). Nine of the questions are reverse scored; scores are combined as a total score (0-180) as well as individual scores for three subscales: symptom distress, interpersonal functioning, and social role performance. Scores that are considered to be in the clinical range are total scores of 63 or over, symptom distress subscale scores of 36 or more, interpersonal functioning subscale scores of 14 or more, and social role performance subscale scores of 12 or more. The OQ 45.2 has exhibited moderate to high concurrent validity with other measures, such as the Symptom Checklist 90-Revised (SCL-90-R) and the Inventory of Interpersonal Problems (IIP; Lambert et al., 1996), and has been used as an outcome measure to assess the phase model of psychotherapy in a training clinic (Callahan, Swift, & Hynan,
The OQ 45.2 has shown a sensitivity index of .85 and a specificity index of .74 when determining patients from non-patients.

The OQ 45.2 has demonstrated strong internal consistency (for students: total scale $\alpha = .93$, subscales $\alpha = .70-.92$; for patients: total scale $\alpha = .93$, subscales $\alpha = .71-.91$) and test-retest reliability (total scale $\alpha = .84$, subscales $\alpha = .78 -.82$ for students; Lambert et al., 1996). In the current study, internal consistency post-birth (before expressive writing; $\alpha =$ total scale: .95; symptom distress scale: .93; interpersonal functioning: .88; social role performance scale: .65; after expressive writing; $\alpha =$ total scale: .96; symptom distress scale: .94; interpersonal functioning: .90; social role performance scale: .69), at the 6-week follow-up, (before expressive writing; $\alpha =$ total scale: .94; symptom distress scale: .92; interpersonal functioning: .87; social role performance scale: .67; after expressive writing; $\alpha =$ total scale: .94; symptom distress scale: .92; interpersonal functioning: .87; social role performance scale: .75), and at the 9-week follow-up ($\alpha =$ total scale: .96; symptom distress scale: .94; interpersonal functioning: .92; social role performance scale: .71) ranged from sufficient to strong, with the exception of the social role performance scale. Due to the inadequate internal consistency of the social role performance scale (survey 2 before and after expressive writing, survey 3 before expressive writing), scale modifications were made to achieve sufficient internal consistency. Removal of one or more scale items did not improve the internal consistency for the survey 2 (before expressive writing) scale; therefore, this scale was not used in subsequent analyses. Removal of the item “I work/study too much” resulted in improvements in internal consistency for the survey 2 (after expressive writing; $\alpha = .71$) and survey 3 (before expressive writing; $\alpha = .73$) scales; these modified scales were used in subsequent analyses.
Perceived Benefits Scale (PBS)

The Perceived Benefits Scale (PBS) is a 38-item self-report measured of positive life change after experiencing a traumatic event. The scale is comprised of eight subscales measuring different domains: increases in self-efficacy, family closeness, community closeness, faith in people, compassion, and spirituality, as well as lifestyle changes and material gain (McMillen & Washington, 1998). Responses are provided on a 5-point Likert scale from “not at all” (0) to “very much” (4). The PBS has demonstrated good construct validity with the Posttraumatic Growth Inventory (PGI). In addition, the PBS has exhibited strong internal consistency in studies with adult sexual assault survivors (α = .94; Borja Callahan, & Long, 2006) and hurricane survivors (α = .97; Borja & Callahan, 2008). Internal consistency of the PBS in the current study ranged from adequate to strong post-birth (α = self-efficacy scale: .90; family closeness scale: .83; community closeness scale: .86; spirituality scale: .92; compassion scale: .89; faith in people scale: .91; lifestyle change scale: .73) and at the 6-week follow-up (α = self-efficacy scale: .92; family closeness scale: .91; community closeness scale: .88; spirituality scale: .92; compassion scale: .88; faith in people scale: .89; lifestyle change scale: .76). Due to an administration error (omission of an item), the material gain scale was unable to be calculated or utilized in the current study.

Perinatal Posttraumatic Stress Disorder Questionnaire (PPQ)

The modified PPQ is a 14-item measure assessing posttraumatic stress symptoms related to the childbirth experience (Callahan, Borja, & Hynan, 2006) and was the primary measure of interest in this study. Questions assess intrusion/re-experiencing symptoms, avoidance behaviors, and hyperarousal/numbing symptoms. Responses are provided on a 5-point Likert scale (0-4), with a total possible score of 0-56. The PPQ has demonstrated strong internal consistency (α =
.85 – 90) and good construct validity, as it was significantly correlated with convergent measures (e.g. Beck Depression Inventory – Second Edition [BDI-II], Impact of Events Scale [IES]) and was not correlated with divergent measures (e.g. Openness scale of NEO-PI-R; Callahan & Hynan, 2006). Additionally, Callahan and colleagues (2006) found that high-risk mothers in their study who scored 19 or higher on the PPQ were almost twice as likely to have sought treatment (positive likelihood ratio = 1.78).

Quinnell and Hynan (1999) sought to test the validity of the PPQ by conducting a study testing its convergent and discriminant validity with other measures. A sample of 142 mothers of premature, healthy full-term, and full-term infants who required hospitalization in the NICU were provided with the PPQ, along with the Impact of Event Scale (IES) and Penn Inventory (PI), to test convergent validity, and the Need for Cognition Scale (NCS), to test for discriminant validity. Results indicated that the PPQ was significantly correlated with both the IES and the PI, and was not significantly correlated with the NCS. Furthermore, the magnitude of the correlation between the PPQ and the IES was greater than the correlation between the PPQ and the PI, or between the IES and the PI. Researchers grouped mothers of preterm infants and mothers of full-term hospitalized infants into a “high-risk” group; this group scored significantly higher on the PPQ and IES than mothers of healthy, full-term infants, but did not differ significantly in terms of scores on the PI or NCS. This study asserted the validity of the PPQ as a measure for PTSD, as evidenced by the magnitude of its correlations among convergent measures relative to its correlation among a divergent measure.

Callahan and Hynan (2002) later conducted a study further investigating the construct validity of the PPQ, in addition to examining the predictive ability risk factors may have in predicting PPQ scores. Participants consisted of 121 mothers of high-risk infants (111 preterm
infants, 10 full-term NICU infants) and 52 mothers of healthy, full-term infants. Mothers answered the PPQ, along with the Impact of Events Scale (IES) and the Beck Depression Inventory – Second Edition (BDI-II), to test convergent validity, and the Openness Scale of the NEO Personality Inventory – Revised (NEO-PI-R), to test discriminant validity. Mothers responded to these measures regarding the four to eighteen month timeframe after childbirth. Results indicated that the PPQ was positively correlated with the IES and the BDI, but was not correlated with the Openness Scale. Furthermore, stronger correlations were found between the PPQ and convergent measures than between the Openness Scale and any of the discriminant measures, thus attesting to the validity of the PPQ. Higher scores on the PPQ, IES, and BDI-II were found in mothers of high-risk infants than in mothers of healthy, full-term infants; no significant differences were found between mothers on the Openness Scale. Of the measures, PPQ scores were the strongest predictor for mothers seeking therapy for their childbirth experience. The age of the mother at the time of childbirth was positively correlated with PPQ scores, while having a Cesarean section was positively correlated with both PPQ scores and IES scores. Of the risk factors observed, the infant’s birth weight was the strongest predictor of PPQ scores. In addition to further supporting the validity of the PPQ as a solid measure of posttraumatic stress symptoms in mothers following childbirth, this study highlighted potential contributing factors, such as a low birth weight and having a cesarean section.

Although these studies supported the PPQ as a strong measure for stress reactions from childbirth, modifications were made to the original design. Responses on the PPQ were changed from a yes/no format to a 5-point Likert scale (0-4) in order to allow for greater response range, and were tested for validity against convergent measures (Impact of Events Scale, IES; and Beck Depression Inventory – Second Edition, BDI-II) and divergent measures (Openness scale from
NEO-Personality Inventory – Revised). Callahan, Borja, and Hynan (2006) conducted this study to examine the effects of modifying the PPQ in terms of its construct validity and predictive ability with 179 mothers. Fifty-eight mothers had “high-risk” infants (47 premature infants, 11 full-term, hospitalized infants) while 86 mothers had “low-risk” healthy, full-term infants. Mothers responded to these measures online regarding the 4-18 months after childbirth.

Component analysis identified three components of the modified PPQ that corresponded with DSM-IV-TR criteria: 44% related to Criterion D, 13% related to Criterion C, and 7% related to Criterion B. Results indicated that the modified PPQ was significantly positively correlated with the IES and BDI-II, but not with the Openness scale. The correlation between the PPQ and IES was significantly stronger than the correlation between the PPQ and the BDI-II; furthermore, convergent correlations were significantly greater than correlations among divergent measures and the Openness scale, affirming the validity of the modified PPQ. Moreover, the modified PPQ was also shown to have higher internal consistency than the original PPQ. Additionally, PPQ scores were positively related to seeking mental health treatment; for example, high-risk mothers with scores of 19 or higher on the modified PPQ were twice as likely to be a good candidate for mental health treatment. Of potential risk factors, complication rating was found to be the only significant predictor of PPQ score. These results supported the construct validity of the newly modified PPQ, while highlighting its ability to predict mothers who may be in need of mental health services.

The PPQ has also been used to assess the predictive ability of a model of perinatal stressors, as DeMier and colleagues (2000) created a measurement model of perinatal stressors for mothers of high-risk infants. After its creation, this model was tested with a sample of mothers, and then tested again with additional mothers to see if it could predict symptoms of
PTSD. In the first study, the measurement model was created with six measures (gestational age of infant, birth weight, length of time spent in hospital, Postnatal Complications rating, and Apgar Scores at 1 and 5 minutes) which loaded onto three underlying factors (Infant Maturity, Complications, and Apgar ratings), and was created with a sample of 189 mothers of preterm infants who had been in the NICU in Indiana. High loadings were observed for gestational age, birth weight, and length of hospitalization on the Infant Maturity factor, along with Apgar ratings at 1 and 5 minutes on Apgar scores, while Postnatal Complications rating and length of hospitalization loaded highly and moderately (respectively) on the Complications factor. This model was then tested with a confirmatory factor analysis with a sample of 165 mothers of preterm infants from a NICU in Florida; once researchers modified the model by dropping two of the constraints, the model fit the Florida sample very well.

Researchers set out to test the predictive ability of this model to identify PTSD symptoms with a sample of 189 mothers of preterm, healthy full-term, and hospitalized full-term infants, in the second study. Mothers answered self-report questionnaires regarding the six measures of the model and completed the Perinatal PTSD Questionnaire (PPQ). Further modifications were made to the model; the Apgar score factor was dropped due to missing data, and the PPQ was added as a new measure in order to determine its predictive quality. Results indicated that the new two-factor model fit well with the sample of mothers, and gestational age, birth weight, length of hospitalization, and PPQ scores loaded on the Infant Maturity factor, while severity of complications, length of hospitalization, and PPQ scores loaded on the Complications factor. PPQ scores were significantly associated with both factors in the new model; furthermore, these two factors accounted for 33% of the variance in maternal PPQ scores. In this study, the PPQ was a helpful tool for measuring the predictive ability of a measurement model of perinatal
stressors that could be used with different samples of mothers. Furthermore, this study mapped out significant risk factors for postnatal PTSD symptoms and their relationships among each other.

In the current study, internal consistency for the PPQ was strong at post birth (before expressive writing: .81; after expressive writing: .89), 6-week follow-up (before expressive writing: .85; after expressive writing: .85), and at the 9-week follow-up (.89) assessments. As this measure was given 5 times throughout the current study (e.g, twice post-birth, twice at the 6-week follow-up, once at the 9-week follow-up), test-retest reliability was computed. Test-retest reliability was strong when the PPQ was administered at the same time point (α = post-birth before and after writing: .89, p < .001; 6-week follow-up before and after writing: .81, p < .001). Strength of the test-retest reliability varied as the time between administrations increased (α = post-birth before writing and 6-week follow-up before writing: .46, p < .001; post-birth before writing and 6-week follow-up after writing: .59, p < .001; post-birth before writing and 9-week follow-up: .51, p < .001; post-birth after writing and 6-week follow-up before writing: .49, p < .001; post-birth after writing and 6-week follow-up after writing: .63, p < .001; post-birth after writing and 9-week follow-up: .63, p < .001; 6-week follow-up before writing and 9-week follow-up: .73, p < .001; 6-week follow-up after writing and 9-week follow-up: .73, p < .001), as can be expected, given the trajectory of positive and negative mental health reactions after childbirth in the current sample.

Posttraumatic Stress Diagnostic Scale (PDS)

The PDS is a 49-item self-report measure that has demonstrated the ability to diagnose PTSD based on DSM-IV criteria and assesses PTSD symptom severity (Foa, Cashman, Jaycox, & Perry, 1997; Borja, Callahan, & Long, 2006). Included in the PDS are a checklist of traumatic
events and 17 questions pertaining to DSM-IV PTSD criteria, which cover re-experiencing, avoidance, and arousal components; and questions evaluating impairment in various areas of life, such as friendships, leisure activity, and schoolwork. DSM-IV diagnostic questions ask how frequently the particular symptom has occurred over the past month and the response is provided in a 4-point Likert scale format (0=not at all or only one time; 3=five or more times a week/almost always; Foa et al., 1997). Symptom severity is indicated by the sum of the 17 symptom questions, resulting in a range of 0-68. Scores above ten are considered to be in the moderate or greater range (Borja et al., 2006). The PDS demonstrated good psychometric properties, as it demonstrated high internal consistency (total symptom severity and re-experiencing, avoidance, and arousal subscales α = .78-.92, Foa et al, 1997; α = .91 on symptom severity scale only, Borja et al., 2006) and test-retest reliability (kappa of .74, 87% agreement of diagnoses over 2-3 week period). Furthermore, the PDS has shown good sensitivity (.89) and specificity (.75) in samples of individuals who have experienced a wide variety of traumas, such as sexual abuse, assault, and natural disasters (Foa et al., 1997). Furthermore, the PDS has shown high diagnostic agreement with the Structured Clinical Interview (SCID), thereby attesting to the construct validity of the measure. Internal consistency for the current study was strong post-birth (.86) and at the 6-week follow-up (.86) assessment.

Subjective Well-Being (SWB)

Participants were asked four subjective well-being questions about the previous week (Callahan, Swift, & Hynan, 2006). Questions are provided in a self-report format with five categorical response options. For example, one question reads: “Currently, how satisfied have you been feeling with your life?” with response options ranging from “not at all satisfied” to “extremely satisfied.” These four subjective questions are similar to the two subjective questions
used by Howard and colleagues (1993) in his three-phase model, which demonstrated a correlation of .79 with the General Well-Being Scale (Dupuy, 1977) in a sample of non-patients. Furthermore, Howard’s (1993) scale was correlated with the positive affect ($r = .51$) and negative affect ($r = -.70$) subscales of Watson and Tellegen’s (1985) separate 10-item factors, and well as with the Medical Outcomes Study measure of disability ($r = -.65$; Stewart, Hays, & Ware, 1988). In a study by Callahan and colleagues (2006), this measure demonstrated acceptable internal reliability ($\alpha = .71$) and test-retest reliability ($\alpha = .63$) over one week. In the current study, internal consistency for the SWB was adequate post-birth (before expressive writing: .81; after expressive writing: .79) and strong at the 6-week follow-up (before expressive writing: .80; after expressive writing: .81) and at the 9-week follow-up (.86).

*Quick Inventory of Depressive Symptomatology (QIDS)*

Derived from the 30-item Inventory of Depressive Symptomatology (IDS), the Quick Inventory of Depressive Symptomatology (QIDS) is a 16-item measure that assesses the nine DSM-IV symptom criterion domains of depression (Rush et al. 2003). The QIDS is available in a self-report format (QIDS-SR), which was the format used in this study, as well as a clinician-report format (QIDS-C), and an interactive voice response format (QIDS-IVR; Rush et al. 2006). The possible range in score is from 0-27, with a higher score indicating greater severity, and is comprised of the highest score from three domains (sleep, psychomotor activity, appetite/weight) and the individual scores from the remaining six domains (sad mood, concentration, energy, interest, guilt, suicidal ideation/plans; Rush et al. 2006). The QIDS-SR has demonstrated high internal consistency (.86) in patients with Major Depressive Disorder (MDD) as well as high concurrent validity with the Inventory of Depressive Symptomatology – Self Report (IDS-SR) and the Hamilton Rating Scale for Depression (HAM-D; Trivedi et al 2004; Rush et al. 2003).
Studies have shown high correlations among QIDS-SR and the two other QIDS formats (QIDS-C and QIDS-IVR), as well as among other well-established measures, such as the Hamilton Depression Rating Scale (HRSD), the IDS-SR, and the HAM-D (Rush et al. 2006, Trivedi et al. 2004, Rush et al. 2003). Internal consistency was found to be .72 (pregnancy), .72 (birth), and .68 (6-week follow-up). However, it should be noted that one item was excluded from internal consistency analysis for the first and second surveys, due to there being no variance on the item (e.g., Since your child’s birth: thoughts of death or suicide). Further, internal consistency for the QIDS at the third survey (e.g., 6-week follow-up) was inadequate; scale analysis indicated stronger internal consistency with the removal of one item (QIDS weight item); therefore, for the third survey, the QIDS total scale was modified to reflect this change.
CHAPTER III
RESULTS

Data Cleaning

Aside from attrition (see participant flow in Figure 1), there were no missing values for survey measures. The online surveys created through Qualtrics were set to require answers on all questions in order to complete the survey; therefore, missing data analysis focused on variables that were computed (e.g., subscale and scale scores). Univariate outliers were examined based on two methods: standardized variables of 3.3 and larger, as well as through box plots. Outliers identified as ‘extreme’ on box plots and through standardized scores were altered by altering the values to be one unit more, or one unit less, than the next highest or lowest value. Outliers identified by only one of these methods, but not both, were not altered. Moreover, outliers identified, but not identified as ‘extreme’ by the box plots, were not altered. This conservative approach to modifying outliers was taken to preserve as much of the raw data as possible. Further, several of these measures were expected to be non-normal, as outliers may represent significant clinical distress. Three outliers were modified in the current study: PPQ total score for survey 3 before writing, PPQ total score for survey 3 after writing, and the PPQ total score for survey 4; all outliers were associated with the same participant. Normality of variables were subsequently analyzed; variables with positive skew were square root transformed (e.g., total scores for PPQ post-birth prior to expressive writing, total scores for PPQ post-birth after expressive writing), while variables with a negative skew were reflected and square root transformed (e.g., total scores for SWB post-birth before expressive writing; total scores for SWB post-birth after expressive writing). Analyses were conducted initially with untransformed
variables and separately with transformed variables; reported analyses do not contain transformed variables.

Of the initial 531 individuals who completed the first survey (e.g., during pregnancy), only 246 of these responses were considered valid. Validity checks, consisting of questions checking basic attention and/or comprehension and evaluation of completion time, were performed in order to screen out initial responses that may be invalid. Validity questions asked respondents to recall aspects of the survey they had completed immediately prior to the question, such as asking respondents of the time frame in question (e.g., over the past month, since the birth of their child, etc.) or the topic of the prior questions (e.g., how their families cope with difficulties). Surveys considered invalid were excluded from all analyses; these respondents were not contacted for later time points of the study.

Participants with valid responses for the first survey were contacted for the second stage of the study. Specifically, participants were emailed weekly, beginning approximately 4 - 6 weeks prior to their estimated due date in order to continue contact for the study and ensure prompt access to the second survey after delivery. Of these 246 valid participants, 92 participants completed the next stage of the study (e.g., post-birth; 37% of the valid sample; 63% attrition). Of the 154 participants who did not continue to the next survey, 12 had expressed via email a desire to discontinue, while the remaining participants who dropped out did not respond to contact attempts. At the time of data analysis, 56 participants completed the 6-week follow-up survey (61% of participants who had completed the second survey; 22.76% of valid responses to the first survey), and 50 participants completed all four surveys of the study (e.g., completed the 9-week follow-up survey; 89% of participants who had completed the third survey; 20% of the valid responses to the first survey).
Descriptive Analyses

Participants who completed all four surveys consisted of 86% (n = 43) females and 14% (n = 7) males. Eighty-six percent of participants were married (n = 43) and 14% (n = 7) were single. Fifty-four percent of participants indicated this was their first child (n = 27), while 46% indicated this was not their first child (n = 23). Two participants had twins, while the remaining sample indicated a single infant was born (96% of sample). The average age for participants was 28.70 years old (SD = 5.66). Eighty-four percent of participants identified as Caucasian (n = 42), while 8% identified as African American (n = 4), 4% as Hispanic/Latino (n = 2), 2% as Native American (n = 1), and 2% as bi-racial/multi-racial (n = 1). At the time of the study, 36% of participants graduated from college (n = 18), 28% completed some college (n = 14), 16% completed a graduate degree (e.g., master’s level degree; n = 8), 14% completed high school (n = 7), 4% obtained a doctorate degree (n = 2), and 2% completed some high school (n = 1). Forty-six percent of participants identified their family’s socio-economic status as middle class (n = 23), 40% as lower-middle class (n = 20), and the remaining 14% as either lower class (6%; n = 3) or upper-middle class (8%; n = 4). All participants who completed the study were English-speaking. Unfortunately, no Spanish-speaking individuals completed the study; therefore, analyses focused solely on responses provided on English surveys. Of the participants who finished the study, there were an equal number of participants in the expressive writing group (experimental group; n = 25) as there were in the neutral writing group (active control group; n = 25).

Attrition analyses were conducted through one-way ANOVAs in order to determine if significant differences existed between participants who fully completed the study and those who dropped out. Participants did not differ on any of the aforementioned demographic variables.
Moreover, participants who dropped out of the study did not differ from the participants who completed the study on any of the outcome measures. Group means and ANOVA results for the outcome measures are provided in Table 3.

Reactions to Childbirth

Of the 50 participants who completed the study, 20% \((n = 10; 2 \text{ males, 8 females})\) met criteria for moderate or greater stress symptoms after childbirth, as specified on the PDS. In regards to depressive symptoms (as measured by the QIDS), 56% of the sample exhibited symptoms indicative of mild depression \((n = 28; 4 \text{ male, 24 female})\), 16% endorsed symptoms indicative of moderate depression \((n = 8; 1 \text{ male, 7 female})\), and 6% endorsed symptoms indicative of severe depression \((n = 3; \text{ all female})\). In all, 22% of the sample reported symptoms of moderate or greater depression. Twelve percent \((n = 6)\) of the participants met criteria for both moderate or greater PTSD symptoms and moderate or greater depression symptoms.

Multiple linear regressions and one-way ANOVAs were conducted to examine predictors of distress after childbirth. Specifically, severity of delivery complications, amount of time the infant was in the hospital, the administration of a C-section, if the infant was still in the hospital, and whether this was the first delivery experience for the parents were examined. Multiple linear regression analyses were conducted to examine if the severity of complications and length of time the infant spent in the hospital predicted distress post-birth (e.g., second survey). While these factors did not predict outcomes related to depression (QIDS), they did predict general levels of distress (OQ 45.2). The results of the regression indicated the two predictors explained 32.10% of the variance in scores on the OQ 45.2 \((R^2 = .35, F(2, 47) = 12.59, p < .001)\). It was found that the severity of complications significantly predicted distress post-birth \((\beta = .32, p = .015)\), as did length of hospitalization \((\beta = .40, p = .002)\). These two predictors also predicted
levels of posttraumatic stress reactions on the PDS, and explained 23% of the variance on this measure ($R^2 = .26, F(2, 47) = 8.30, p = .001$). Although severity of complications did not individually predict stress reactions in this model, length of hospitalization was a significant predictor ($\beta = .38, p = .006$). Stress reactions on the PPQ were also assessed, and the overall regression model was found to be significant and explained 32.50% of variance ($R^2 = .35, F(2, 47) = 12.81, p < .001$). In this model, both severity of complications ($\beta = .31, p = .018$) and length of hospitalization ($\beta = .41, p = .002$) were found to significantly predict posttraumatic stress reactions. Regression results are presented in Table 4. One-way ANOVAs (Table 5) were conducted to evaluate the influence of whether this was the first delivery experience for the parent, if the infant was still hospitalized, and if a C-section occurred, and the impact these factors may have on stress and depressive reactions after childbirth. None of these variables significantly impacted responses on any of the study outcome measures.

Expressive Writing Comparisons

Group differences on outcome measures (e.g., OQ 45.2, PPQ, SWB) prior to the expressive writing intervention were assessed using a one-way analysis of variance (ANOVA); these results are presented in Table 6. Means for the experimental group and active control group did not significantly differ, suggesting that participants in each group experienced a comparable level of distress (as measured on the OQ 45.2 and PPQ) and well-being (as measured on the SWB) after birth.

Subsequent analyses investigated the potential effects of the experimental condition (e.g., expressive writing condition vs. neutral writing condition) on symptoms of distress and well-being over time. The amount of reported time of writing differed for participants, as they had been instructed to “just really let go and write as much as you can about the positive aspects of
the experience” (or about the neutral topic, for those in the active control group). For the first writing session, participants wrote for an average of 3.73 minutes, with a wide variability between writing times per person (SD = 3.68, range of .50 – 20.00 minutes; control group M = 2.65 minutes, SD = 2.93, range of .50 – 15.00 minutes; experimental group M = 4.80 minutes, SD = 4.08, range of 1.00 – 20.00 minutes). For the second writing session, participants wrote for an average of 3.50 minutes (SD = 2.60; control group M = 2.13 minutes, SD = 1.45, range of <.50 – 5.00 minutes; experimental group M = 4.86 minutes, SD = 2.79, range 1.00 – 14.00 minutes).

Outcome Questionnaire 45.2 (OQ 45.2)

A mixed between-within subjects analysis of variance (ANOVA) was conducted to compare scores on the OQ 45.2 between participants in the experimental and active control groups across five time periods (e.g., post-birth before writing, post-birth after writing, 6-week follow-up before writing, 6-week follow-up after writing, 9-week follow-up). Due to a violation of the sphericity assumption, Mauchley’s W(9) = .037, p < .001, multivariate tests were analyzed. There was a significant main effect for time, Wilks’ Lambda = .67, F(4, 45) = 5.48, p = .001, partial eta squared = .33, with both groups exhibiting a general decrease in OQ 45.2 scores, albeit an increase in scores at the third time point (e.g., 6-week follow-up before expressive writing condition). Although there was a significant change in scores over time, there was not a significant difference in scores between the first and last time points. The main effect of study condition (e.g., expressive writing vs. active control) was not significant, nor was the interaction between time and study group, suggesting experimental condition did not exert a significant effect on OQ 45.2 scores. Group differences are presented in Table 7; ANOVA results are presented in Table 8. Group scores on the OQ 45.2 are presented in Figure 2 (note:
standardized scores are displayed due to the varying scales for each outcome measure). One-way ANOVAs indicated the study groups did not differ significantly on their OQ 45.2 scores at any of the five time points.

**Perinatal Posttraumatic Stress Disorder Questionnaire (PPQ)**

A mixed between-within subjects ANOVA was conducted to evaluate scores on the PPQ between participants in the experimental and active control groups across the same five time periods. The assumption of sphericity was again violated in this analysis, Mauchley’s W(9) = .27, p < .001, so multivariate tests were employed. Results indicated there were no significant effects of time, study group, or a significant interaction between study group and time. Group differences are presented in Table 7; ANOVA results are presented in Table 8. Group scores on the PPQ are presented in Figure 2 (note: standardized scores are again displayed due to the varying scales for each outcome measure). One-way ANOVAs indicated the study groups did not differ significantly on their PPQ scores at any of the five time points.

**Subjective Well-Being (SWB)**

Participants’ scores on the SWB over 5 time points were also analyzed with a mixed between-within subjects ANOVA. Multivariate tests were analyzed due to a violation of the sphericity assumption, Mauchley’s W(9) = .31, p < .001. Results indicated there was a significant main effect for time, Wilks’ Lambda = .75, F(4, 45) = 3.73, p = .010, partial eta squared = .25. Participants exhibited a significant change in well-being scores from the initial time point (post-birth before writing activity) to the final time point (9-week follow-up). In general, participants exhibited a trend towards an increase in well-being scores over time, although participants in both conditions exhibited a decrease in SWB scores (indicating a decrease in well-being) during the time between the post-birth and 6-week follow-up surveys.
While there was a significant change in scores over time, there was not a significant difference in scores between the first and last time points. The main effect of experimental condition was not significant, nor was the interaction between experimental condition and time. Group differences are presented in Table 7; ANOVA results are provided in Table 8. Group scores on the SWB are presented in Figure 2 (note: standardized scores are displayed due to the varying scales for each outcome measure). One-way ANOVAs indicated the study groups did not differ significantly on their SWB scores at any of the five time points.

Expressive Writing Comparisons – Distressed Sample

Mental health outcomes were re-examined for participants with elevated levels of distress, as opposed to all participants, given prior researchers calling into question the potential utility of expressive writing for healthy individuals with strong coping skills (Bootzin, 1997). Follow-up analyses with stratification based on levels of distress as indicated by the PDS (e.g., scores of more than 10) were conducted; however, the resulting sample size was very small (6 participants in the active control group, 4 participants in the experimental group) and lacked adequate power.

Outcome Questionnaire 45.2 (OQ 45.2)

A follow-up mixed between-within subjects ANOVA was conducted to re-evaluate scores on the OQ 45.2, with participants endorsing levels of distress on the PDS. Sphericity was not preserved, Mauchley’s W(9) = .01, p < .001, so multivariate tests were utilized. There was not a significant main effect of time, study group, or a significant interaction between study group and time. Group differences are presented in Table 9; ANOVA results are presented in Table 10. One-way ANOVAs indicated the OQ 45.2 scores of distressed participants did not differ significantly based on experimental condition at any of the five time points. Group scores
on the OQ 45.2 are presented in Figure 3 (note: standardized scores are displayed due to the varying scales for each outcome measure).

*Perinatal Posttraumatic Stress Disorder Questionnaire (PPQ)*

Additional analyses were conducted investigating the potential effect of the expressive writing condition on participants with significant levels of distress (e.g., PDS scores greater than 10). Results of the mixed between-within subjects ANOVA indicated a significant effect of time, $F(4, 32) = 4.39$, $p = .006$, partial eta squared = .35. However, there was not a significant main effect for study group or a significant interaction between time and group. The difference in significance of results based on time between the full sample and distressed sample highlights the utility and specific focus of this measure with individuals experiencing posttraumatic stress reactions. Unlike the trajectory witnessed with the full sample on the OQ 45.2 and the SWB, stress reactions on the PPQ significantly decreased from the second to the third time point (e.g., at the 6-week follow-up), while the overall PPQ scores showed a general declining trend. Although there was a significant change in PPQ scores over time, scores for time 1 and time 5 did not differ significantly from each other. Group differences are presented in Table 9; ANOVA results are presented in Table 10. One-way ANOVAs indicated the PPQ scores of distressed participants did not differ significantly based on experimental condition at any of the five time points. Group scores on the PPQ are presented in Figure 3 (note: standardized scores are displayed due to the varying scales for each outcome measure).

*Subjective Well-Being (SWB)*

Subsequent analyses utilizing participants who endorsed levels of distress on the PDS (post-birth before the expressive writing condition) were conducted, resulting in 11 participants
(6 active control, 5 expressive writing). Similar to the prior analysis with the full sample (e.g., 50 participants), the sphericity assumption was violated, Mauchley’s W(9) = .05, \( p = .028 \). Multivariate test results indicated no statistically significant main effects of time and experimental condition. Further, there was not a significant interaction between time and experimental condition. Group differences are presented in Table 9; ANOVA results are presented in Table 10. One-way ANOVAs indicated the SWB scores of distressed participants did not differ significantly based on experimental condition at any of the five time points. Group scores on the SWB are presented in Figure 2 (note: standardized scores are displayed due to the varying scales for each outcome measure).

Validation of the Perinatal Posttraumatic Stress Disorder Questionnaire (PPQ)

The final aim of the current study was to examine the validity of the PPQ in a sample of new mothers and fathers. Convergent validity of the PPQ was assessed by measures conceptually related to the PPQ (e.g., measures of distress and well-being): the PDS and the SWB. The PPQ displayed strong correlations with the PDS post-birth, \( r(48) = .84, p < .001 \), and at the 6-week follow-up, \( r(48) = .77, p < .001 \). Similarly, the PPQ displayed moderate inverse correlations with the SWB post-birth, \( r(48) = -.66, p < .001 \), and at the 6-week follow-up, \( r(48) = -.69, p < .001 \).

Discriminant validity was assessed by measures conceptually unrelated to the PPQ, such as measures assessing the problem-solving style and behavioral strategies of families when encountering difficult events (e.g., F-COPES), and measures evaluating positive life change after traumatic events (e.g., subscales of the PBS). Correlations between the PPQ and F-COPES were not statistically significant post-birth or at the 6-week follow-up, supporting the notion that these measures are assessing different constructs. Similarly, correlations between the PPQ and...
subscales of the PBS were also found not to be significant at the post-birth and 6-week follow-up time points. Correlations are provided in Table 11.

These results lend further support to the construct validity of the PPQ as a measure of stress reactions following childbirth. As expected, the PPQ displayed significantly stronger correlations with measures conceptually related to the PPQ (e.g., measures assessing distress and well-being), than with measures conceptually unrelated (e.g., measures assessing family coping style and perceived benefits following traumatic stressors; see Table 12 for results from tests for significant difference between dependent correlations; Lee & Preacher, 2013).
CHAPTER IV
DISCUSSION

While childbirth can be a joyful time for many parents, various studies have highlighted that it may also be a very stressful, potentially traumatic, experience for some individuals (Soet et al., 2003; Czarnocka & Slade, 2000). Studies have examined the prevalence of posttraumatic stress symptoms in mothers and fathers, noting estimates ranging from approximately 3% up to 41%, with mothers of high-risk infants in the NICU often experiencing higher prevalence rates than mothers of healthy full-term infants (Soet et al., 2003; Czarnocka & Slade, 2000; Ansermet et al., 2003; Feeley et al., 2011; Vanderbilt et al., 2009). In addition to stress reactions, mothers and fathers have also been shown to exhibit symptoms of depression (Paulson et al., 2006; O’Hara & Swain, 1996; Mackley et al., 2010). As with stress reactions, mothers of infants in the NICU tend to display higher rates of depressive symptoms after childbirth than mothers of healthy infants (Davis et al., 2003; Lefkowitz et al., 2010).

Stress and depressive reactions following childbirth not only affect the parents, but may also affect their children. For instance, studies have illustrated effects of cortisol levels on newborn reflexes and maternal anxiety on the reaction time in 5 year olds (Lundy et al., 1999; Loomans et al., 2012). Maternal depression has been linked to negative affect in newborns during interactive play sessions with mothers, as well as asymmetry on EEGs (Jones et al., 2001; Diego et al., 2006; Jones et al., 2001). A study investigating the longer term effects of exposure to postnatal depression during infancy found an association with higher levels of cortisol and slower completion times in emotional categorization tasks in a sample of college students (Douglas & Harmer, 2011).
Given the prevalence of stress and depressive reactions after childbirth in parents, and the potential negative effects on their children, the availability of efficient treatment is vital. In addition to therapeutic treatment, expressive writing has been utilized as a means for expression after the experience of a traumatic event. Studies have supported the use of expressive writing in individuals with who have experienced trauma (Hirai et al., 2012; Smyth & Helm, 2003). However, expressive writing studies have not found global effects, and have subsequently investigated potential moderating variables to better understand when and for whom and in what situations expressive writing may be effective. Studies have structured their expressive writing interventions in a variety of ways, such as having focused topics (e.g., such as looking at the benefits of a stressful experience, such as in the current study) or unfocused topics, conducting the writing in person in a lab (which could be private or public) or at home (such as through the internet), the length and number of writing sessions, among other factors. Some studies using internet-based expressive writing interventions have found promising results (Hirai et al., 2012; increase in posttraumatic growth, Stockton, Joseph, & Hunt, 2014), suggesting a feasible and accessible intervention for individuals. Feasibility and accessibility options of an intervention may be especially important for new parents, given their time constraints and busy schedules. This was a driving factor in the examination of an intervention that could be utilized at home for new parents.

The first aim of the study involved examination of the prevalence of negative mental health outcomes (e.g., stress and/or depression) following childbirth. In the current study, approximately one-fifth (stress $n = 10$; depression $n = 11$) of the sample experienced moderate or greater levels of posttraumatic stress reactions and/or depression. The prevalence of these reactions highlights the potential stress and impact individuals can experience after childbirth,
and supports the need for available and effective mental health treatment options for this population. Consistent with prior studies noting the influence of birth factors on stress reactions, posttraumatic stress reactions following childbirth were influenced by severity of childbirth complications and length of time the infant was hospitalized. Awareness of this association may aid individuals and health care workers in the early identification of mothers and fathers who may benefit from mental health and supportive interventions.

Examining the utility of a home-based expressive writing intervention in new parents was the second aim of the current study. When examining the full sample of participants, the expressive writing manipulation did not significantly affect participants’ level of distress (as measured by the OQ 45.2 or the PPQ) or well-being (as measured by the SWB). However, levels of distress on the OQ 45.2 varied significantly over the course of the study. Specifically, participants experienced a significant decrease in stress levels after the first writing activity (post-birth), but encountered an elevation in distress levels at the 6-week follow-up (before the expressive writing task), although this was not a significant increase. Participants endorsed a significant decrease in distress levels after the second expressive writing task as well. While many expressive writing studies report an increase in negative emotions immediately following expressive writing tasks, the decrease in distress levels in the current sample may be attributed to the directive for participants to focus on positive aspects of the childbirth experience, or the neutral control topic, as opposed to focusing on the negative aspects of the event. This may also be influenced by the short duration of the writing sessions, as participants may not have engaged in the writing topic as fully as participants have in prior studies.

Although significant results were not found for the full sample in regards to assessment of posttraumatic stress reactions (e.g., PPQ), similar results to the OQ 45.2 were found with the
SWB. Specifically, the expressive writing manipulation was not found to have a significant
effect on well-being. However, well-being changed significantly over time. Well-being scores
increased significantly after the writing task post-birth, indicating greater levels of well-being,
but dropped at the 6-week follow-up. Notably, this decline in well-being scores was not a
significant difference from the second time point. Well-being scores significantly improved once
again after the second writing task, as was also seen with the OQ 45.2. Similarly, the increase in
positive emotions (or well-being) after the writing tasks may be attributable to the act of writing
in general, or as a distracter, given that there was not a significant difference in well-being scores
based on the writing topic. Alternatively, the change in well-being scores (and distress scores on
the OQ 45.2) may also be more reflective of the general trajectory of positive and negative
emotions following childbirth. Indeed, a study investigating the course of postpartum depression
(PPD) symptoms noted an increase in symptoms at the 6-week follow-up, as compared to post-
birth and 12-week follow-up time points (Posner, Unterman, Williams, & Willams, 1997).

When including only participants with a significant amount of distress, results appeared
to differ from those that were found with the full sample. Specifically, significant effects were
not found on the OQ 45.2 or the SWB, but a significant effect of time was found on the PPQ. For
individuals with significant distress post-birth, a significant decrease in stress symptoms were
found at the 6-week follow-up (as compared to the post-birth symptom endorsements after the
expressive writing task). This is the opposite pattern witnessed on the OQ 45.2 and SWB with
the full sample, as an increase in negative emotion (or decrease in positive emotion) was shown
at that time point. After both writing sessions, distressed participants exhibited a slight increase
(though not significant) in their stress symptoms, which more closely resembles the typical
trajectory often seen in expressive writing studies. This trajectory may also be reflective of
natural recovery, which highlights the spontaneous reduction of posttraumatic stress symptoms in the 6 months post-birth (Ayers & Pickering, 2001).

Overall, results of the expressive writing manipulation were inconclusive for general distress, posttraumatic stress symptoms, and well-being, in both the full sample and in only distressed participants. The effects of time on these outcome measures may be reflective of the natural and typical patterns seen typically with posttraumatic distress and depression after childbirth (Ayers & Pickering, 2001; Posner, Unterman, Williams, & Willams, 1997). In addition, results from the expressive writing manipulation (e.g., significant main effect of time, inconclusive results of expressive writing condition) may also be related to the exposure to the stressful event throughout the questionnaires, as participants were asked to respond to a multitude of questions surrounding their functioning, emotions, and perceptions following their childbirth experience. That is, those in the active control condition did in fact have exposure to thoughts about their stressful event through these questions, prior to their writing interventions.

Rubin, Boals, and Klein (2010) noticed a similar pattern of results in their expressive writing studies, namely, that both groups (those that completed an expressive writing task and those that completed a control writing task) displayed a significant improvement of symptoms through the experiment that was not dependent upon writing group. They posited that the act of completing prior questionnaires (which had required participants to actively think about aspects of their trauma) is similar to the actions found in exposure therapy, and also may have encouraged continuing processing of the event after the completion of their questionnaires. A follow-up to this study was conducted by Boals, Hathaway, and Rubin (2011), further supporting the improvement of symptoms after completing autobiographical memory questionnaires of stressful events. Importantly, this improvement was dependent upon the type of memory accessed during
the questionnaires: improvements were seen when participants were told to complete the questionnaires in regards to a distressing event, but not when told to think about a positive event.

There may also be a potential effectiveness of expressive writing in this population that was missed in the current study, as a prior study did find significant effects for expressive writing on posttraumatic stress symptoms after childbirth (Blasio, Ionio, & Confalonieri, 2009). While it is important to note that this study did not utilize a neutral writing control group, the expressive writing group exhibited significantly less overall stress symptoms and avoidance symptoms within 48 hours of delivery, after completing a single 10-15 minute expressive writing session. A significant difference in overall stress symptoms and hyperarousal symptoms were found between the two groups at the 2-month follow-up. Although this study suggests a positive effect for expressive writing, the lack of a neutral writing group is salient. Given the significant improvements in general distress and well-being levels for both groups of the full sample of participants immediately after writing sessions, examination of the utility of writing in general, or as a distracter, as compared to the proposed benefits of expressive writing in particular, may be important for a more comprehensive understanding of these outcomes.

The final aim of the study pertained to the PPQ validity. The stronger correlations with related items, such as the measurement of PTSD symptoms, as opposed to distinct items such as family coping and perceived benefits, lends support to the use of this measure in assessing posttraumatic stress reactions following childbirth.

Generalizability, Limitations, and Future Directions

Although this study was made nationally available, the diversity of the sample is lacking. Specifically, the great majority of participants were Caucasian (84%) and English-speaking. Thus, the results of this study are generalizable to other new parents with these same
demographics. Moreover, these results are generalizable to individuals with access to computers. This differs from the sample recruited by Buhrmester and colleagues (2013); however, this may be partially influenced by the research parameters set by the current study (e.g., only participants in the United States). Emphasis of a greater variety in demographics, such as age, gender, ethnicity, SES, etc., in future studies may enable a more comprehensive view on the experiences of both mothers and fathers after birth.

An important limitation in the current study pertains to the extremely low power in several expressive writing analyses, given the small sample size. This may have been an important contributing factor to the inconclusive results regarding the effect of the expressive writing manipulation (e.g., expressive writing condition vs. active control condition) and/or any interaction effects between the group condition and time. Related, the high attrition rate in the study dramatically decreased the number of participants who completed the study, as compared to those who began (80% attrition rate from valid first surveys to completed fourth surveys). When working with this population of individuals who are likely to be encountering a very significant, and sometimes stressful, life change, future researchers should especially mindful of the lack of time that may be present in the schedules of new parents, and seek to find strategies to make participation less time consuming.

Another limitation of the current study’s high attrition rate of participants involves the potential loss of participants who encountered significant distress during/after childbirth. Specifically, approximately 63% of valid participants from the first survey failed to complete the second survey. It is therefore impossible to determine the characteristics of this sample and their reactions to childbirth. While the majority of the current sample of participants who fully completed the study were generally healthy, it is possible that some of the participants who
dropped out from the study prior to the second survey experienced significant distress throughout their childbirth experience. In fact, prior suggestions have called into question the effectiveness of expressive writing for healthy individuals with strong coping skills, as compared to those currently experiencing significant distress (Bootzin, 1997). However, unfortunately, when specifically examining the utility of the expressive writing intervention in individuals with significant levels of distress in the current sample, the sample size (and power) was constricted even further. Future research with specific focus on lessening study attrition with this population, especially those encountering significant difficulties associated with childbirth and delivery, will be important in order to better understand the variety of severity of childbirth experiences.

In addition to these limitations, the current study’s expressive writing manipulation deviated from several other expressive writing studies in several ways. First, participants were told to “just really let go and write as much as you can” and were then asked to record how many minutes they spent writing. In all conditions, the mean amount of time spent writing was below 15 minutes, which has been shown to be significantly less effective than writing session times of 15 minutes or greater in terms of overall effect sizes (Frattaroli, 2006). In fact, the mean for writing in all conditions for both groups was below 5 minutes. This short amount of time may have been too quick for participants to engage fully in their writing topic. However, other studies have shown positive effects of writing of a lesser amount of time than 15 minutes (Smyth & Pennebaker, 2008). While the ability of participating in expressive writing interventions from home may be more accommodating and adaptive for parents of infants, such a setting may also increase the chance for research error, as there is likely to be less standardization in the expressive writing administration than would be found in a laboratory setting. However, this may be more reflective of the real-world application of expressive writing home interventions, as
individuals may be more variable in their adherence to the recommended structure. Future studies specifying a greater amount of time (such as 20 minutes) for writing with this population may be better able to understand the effects of expressive writing interventions than the current study.

The systematic review of expressive writing studies conducted by Frattaroli (2006) also highlighted the impact of number of writing sessions, finding that there was a greater overall effect size, psychological effect size, and subject impact in studies where there were 3 or more expressive writing sessions, as compared to fewer. The current study utilized 2 writing sessions, which may be an important factor for the inconclusive results of the expressive writing manipulation. Future research examining the utility of expressive writing in this population should aim to increase the length and number of writing sessions from the current study in order to examine the potential effects that may have. As systematic reviews have investigated moderating variables in the utility of expressive writing interventions (Smyth, 1998; Frattaroli, 2006; Smyth & Pennebaker, 2008), exploration of these potential moderators (such as personality variables, setting variables, etc.) in tandem with this population may be especially fruitful to inform the question of when and for whom expressive writing is useful, particularly in this population.

Implications

The prevalence of stress and depressive reactions to childbirth in this prospective longitudinal study emphasizes the potentially stressful and traumatic experience childbirth may be for some individuals. Better understanding of the contributing factors to the development of negative mental health outcomes (such as anxiety, stress, and depression), as opposed to positive mental health outcomes and/or strong coping abilities, may help target interventions for new
parents. A focus on interventions that are both accessible and feasible, given the incredible time constraints many new parents face, could be especially useful in supporting this population and their families. Given the inconclusive results of the expressive writing manipulation in this study, future studies investigating individual, setting, and personality variables that may be influential or moderating in the effectiveness of expressive writing may be beneficial. While these results also suggest a potential natural recovery for some participants, interventions for support in the short-term timeframe after childbirth may continue to be useful.
Table 1.

**Procedures for Active Control Group**

<table>
<thead>
<tr>
<th>Outline of Procedures and Their Timing for ACTIVE CONTROL GROUP</th>
<th>Baseline (A)</th>
<th>1 week (B1)</th>
<th>6 weeks (B2)</th>
<th>9 weeks (D)</th>
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<tr>
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<tr>
<td>F-COPES (familial coping with crisis)</td>
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* Measure was administered twice; once before the neutral writing activity and once immediately after the expressive writing intervention.
Table 2.

**Procedures for Experimental Group**

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<td>PDS (PTSD diagnostic scale)</td>
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<td>PBS (perceived benefits following stressor)</td>
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<tr>
<td>SWB (subjective well-being)</td>
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<td>X*</td>
<td>X*</td>
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<tr>
<td>OQ45.2 (broad symptom distress)</td>
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<td>X*</td>
<td>X*</td>
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* Measure was administered twice; once before the expressive writing intervention and once immediately after the expressive writing intervention.
### Table 3

**Attrition Analysis: Outcome Measures**

<table>
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<tr>
<th></th>
<th>Study Completers (n = 50)</th>
<th>Study Non-Completers (n = 42)&lt;sup&gt;a&lt;/sup&gt; (n = 6)&lt;sup&gt;b&lt;/sup&gt;</th>
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<tr>
<td>Measures</td>
<td>M</td>
<td>SD</td>
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<tr>
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<td>2.91</td>
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*Note. OQ 45.2: Outcome Questionnaire 45.2; PPQ: Perinatal Posttraumatic Stress Disorder Questionnaire; SWB: Subjective Well Being Scale. Time 1 administered post-birth before expressive writing; Time 2 administered post-birth after expressive writing; Time 3 administered at 6-week follow-up before expressive writing; Time 4 administered at 6-week follow-up after expressive writing. <sup>a</sup>: Number of non-completers at Time 1 and 2; <sup>b</sup>: Number of non-completers at Time 3 and 4; <sup>c</sup>: Degrees of freedom for Time 1 and 2; <sup>d</sup>: Degrees of freedom for Time 3 and 4.*
Table 4

Predictors of Mental Health Outcomes Post-Birth

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Variable</th>
<th>β</th>
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<th>p</th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>F (2, 47)</th>
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Note. OQ 45.2: Outcome Questionnaire 45.2; PDS: Posttraumatic Stress Diagnostic Scale; PPQ: Perinatal Posttraumatic Stress Disorder Questionnaire; QIDS: Quick Inventory of Depression. Bolded scores are significant at the $p < .05$ level.
Table 5

*Post-Birth Mental Health Outcome Predictors: One-Way ANOVA*

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<td>SD=8.06,</td>
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<td>SD=3.68,</td>
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</table>

*Note. OQ 45.2: Outcome Questionnaire 45.2; PDS: Posttraumatic Stress Diagnostic Scale; PPQ: Perinatal Posttraumatic Stress Disorder Questionnaire; QIDS: Quick Inventory of Depression.*
Table 6

*Post-Birth Group Comparisons Prior to Expressive Writing*

<table>
<thead>
<tr>
<th>Measures</th>
<th>Expressive Writing (n = 25)</th>
<th>Active Control (n = 25)</th>
<th>F(1, 48)</th>
<th>p</th>
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<td>M 38.60 SD 27.69</td>
<td>M 46.68 SD 16.47</td>
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<td>.252</td>
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</table>

*Note.* OQ 45.2: Outcome Questionnaire 45.2; PPQ: Perinatal Posttraumatic Stress Questionnaire; SWB: Subjective Well-Being.
Table 7

Expressive Writing Outcome Descriptives

<table>
<thead>
<tr>
<th>Time</th>
<th>Measures</th>
<th>Expressive Writing ( (n = 25) )</th>
<th>Active Control ( (n = 25) )</th>
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<tbody>
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<td></td>
<td></td>
<td>( M )</td>
<td>( SD )</td>
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<td>Time 1</td>
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<td>27.79</td>
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<td>PPQ</td>
<td>6.36</td>
<td>7.04</td>
</tr>
<tr>
<td></td>
<td>SWB</td>
<td>15.20</td>
<td>3.33</td>
</tr>
<tr>
<td>Time 2</td>
<td>OQ 45.2</td>
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<td>26.81</td>
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<td>PPQ</td>
<td>6.12</td>
<td>7.29</td>
</tr>
<tr>
<td></td>
<td>SWB</td>
<td>15.68</td>
<td>3.38</td>
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<td>SWB</td>
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<td>22.92</td>
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<td>PPQ</td>
<td>5.68</td>
<td>4.85</td>
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<td>SWB</td>
<td>15.92</td>
<td>3.28</td>
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<td>Time 5</td>
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Note. OQ 45.2: Outcome Questionnaire 45.2; PPQ: Perinatal Posttraumatic Stress Disorder Questionnaire; SWB: Subjective Well Being Scale. Time 1 administered post-birth before expressive writing; Time 2 administered post-birth after expressive writing; Time 3 administered at 6-week follow-up before expressive writing; Time 4 administered at 6-week follow-up after expressive writing; Time 5 administered at 9-week follow-up.
Table 8

**Expressive Writing Outcome Mixed Between-Within Subjects ANOVA**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Variable</th>
<th>Wilks’ Lambda</th>
<th>F</th>
<th>df</th>
<th>p</th>
<th>Partial Eta Squared</th>
<th>Observed Power</th>
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<td>.96</td>
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<td>Group</td>
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<td>2.76</td>
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<td>.37</td>
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<td>4, 45</td>
<td>.367</td>
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<td>.32</td>
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<td>PPQ</td>
<td>Time</td>
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<td>.11</td>
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<td>Group</td>
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<td>1.73</td>
<td>1, 48</td>
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*Note. OQ 45.2: Outcome Questionnaire 45.2; PPQ: Perinatal Posttraumatic Stress Disorder Questionnaire; SWB: Subjective Well Being Scale. Bolded scores are significant at the p < .05 level.*
Table 9

Expressive Writing Outcome Descriptives of Participants with Distress

<table>
<thead>
<tr>
<th>Time</th>
<th>Measures</th>
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<th>Active Control (n = 6)</th>
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<td>SD</td>
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<td>PPQ</td>
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<td>7.85</td>
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<tr>
<td></td>
<td>SWB</td>
<td>9.75</td>
<td>4.35</td>
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<tr>
<td>Time 2</td>
<td>OQ 45.2</td>
<td>76.25</td>
<td>34.04</td>
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<td>8.29</td>
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<tr>
<td></td>
<td>SWB</td>
<td>10.75</td>
<td>5.91</td>
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<tr>
<td>Time 3</td>
<td>OQ 45.2</td>
<td>65.50</td>
<td>13.96</td>
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<td>PPQ</td>
<td>7.00</td>
<td>5.48</td>
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<td>SWB</td>
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Note. OQ 45.2: Outcome Questionnaire 45.2; PPQ: Perinatal Posttraumatic Stress Disorder Questionnaire; SWB: Subjective Well Being Scale. Time 1 administered post-birth before expressive writing; Time 2 administered post-birth after expressive writing; Time 3 administered at 6-week follow-up before expressive writing; Time 4 administered at 6-week follow-up after expressive writing; Time 5 administered at 9-week follow-up.
Table 10

Expressive Writing Outcome Mixed Between-Within Subjects ANOVA of Participants with Distress

<table>
<thead>
<tr>
<th>Measure</th>
<th>Variable</th>
<th>Wilks’ Lambda</th>
<th>F</th>
<th>df</th>
<th>p</th>
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<th>Observed Power</th>
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<td>.09</td>
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<td>1, 8</td>
<td>.300</td>
<td>.13</td>
<td>.17</td>
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<td>Time*Group</td>
<td>.77</td>
<td>.38</td>
<td>4, 5</td>
<td>.813</td>
<td>.24</td>
<td>.09</td>
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</tbody>
</table>

Note. OQ 45.2: Outcome Questionnaire 45.2; PPQ: Perinatal Posttraumatic Stress Disorder Questionnaire; SWB: Subjective Well Being Scale. Bolded scores are significant at the $p < .05$ level.
Table 11

*Construct Validity of the PPQ*

<table>
<thead>
<tr>
<th>Measure</th>
<th>df</th>
<th>Pearson Correlation (r)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Convergent Measures</strong></td>
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<tr>
<td>Post-Birth</td>
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</tr>
<tr>
<td>PDS</td>
<td>48</td>
<td>.84</td>
<td>&lt;.001</td>
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<tr>
<td>SWB</td>
<td>48</td>
<td>-.66</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>6-week Follow-up</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDS</td>
<td>48</td>
<td>.77</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>SWB</td>
<td>48</td>
<td>-.69</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>Discriminant Measures</strong></td>
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<tr>
<td>Post-Birth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-COPES</td>
<td>48</td>
<td>-.15</td>
<td>.286</td>
</tr>
<tr>
<td>PBS Compassion</td>
<td>48</td>
<td>.13</td>
<td>.385</td>
</tr>
<tr>
<td>PBS Faith in People</td>
<td>48</td>
<td>.14</td>
<td>.335</td>
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<tr>
<td>F-COPES</td>
<td>48</td>
<td>-.11</td>
<td>.459</td>
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<td>PBS Compassion</td>
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<td>.14</td>
<td>.338</td>
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<tr>
<td>PBS Faith in People</td>
<td>48</td>
<td>-.12</td>
<td>.390</td>
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</tbody>
</table>

*Note.* PPQ: Perinantal Posttraumatic Stress Disorder Questionnaire; PDS: Posttraumatic Stress Diagnostic Scale; SWB: Subjective Well-Being Scale; F-COPES: Family Crisis Oriented Personal Evaluation Scales; PBS: Perceived Benefits Scale. Bolded items are significant at the *p* < .001 level.
Table 12

**Tests for Significant Differences Between Dependent Correlations**

<table>
<thead>
<tr>
<th>Time</th>
<th>Correlated Variables</th>
<th>Pearson Correlation (r)</th>
<th>Z-Score</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post-Birth</strong></td>
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<td></td>
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<td>FCOPES</td>
<td>-.19</td>
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<td>PBS Compassion</td>
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<td>5.48</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>PDS</td>
<td>PBS Faith in People</td>
<td>.11</td>
<td>5.38</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>SWB</td>
<td>FCOPES</td>
<td>.39</td>
<td>-3.85</td>
<td>&lt;.001</td>
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<tr>
<td>SWB</td>
<td>PBS Compassion</td>
<td>.16</td>
<td>-4.99</td>
<td>&lt;.001</td>
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<tr>
<td>SWB</td>
<td>PBS Faith in People</td>
<td>.17</td>
<td>-5.09</td>
<td>&lt;.001</td>
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<tr>
<td><strong>6-week Follow-up</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDS</td>
<td>FCOPES</td>
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<td>PBS Compassion</td>
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<td>PBS Faith in People</td>
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<td>&lt;.001</td>
</tr>
<tr>
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<td>FCOPES</td>
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<tr>
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<td>PBS Compassion</td>
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<td>&lt;.001</td>
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<tr>
<td>SWB</td>
<td>PBS Faith in People</td>
<td>.41</td>
<td>-4.47</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

*Note.* PPQ: Perinatal Posttraumatic Stress Disorder Questionnaire; PDS: Posttraumatic Stress Diagnostic Scale; SWB: Subjective Well-Being Scale; F-COPES: Family Crisis Oriented Personal Evaluation Scales; PBS: Perceived Benefits Scale. Bolded items are significant at the *p* < .001 level.
Figure 1.

Participant Attrition

Recruitment Phase (Pregnancy Survey): 
\( N = 531 \)

Validity Check: 
Valid \( n = 246 \); Invalid \( n = 285 \); 
12 withdrew, 273 did not respond

Second Survey – Post-birth: 
Completed \( n = 92 \); 
Did not complete \( n = 154 \).

Third Survey – 6 weeks after birth: 
Completed \( n = 56 \); 
Did not complete \( n = 36 \)

Fourth Survey – 9 weeks after birth: 
Completed \( n = 50 \) 
Did not complete \( n = 6 \)
Figure 2.

*Expressive Writing Outcomes*

*Note.* OQ 45.2: Outcome Questionnaire 45.2; PPQ: Perinatal Posttraumatic Stress Disorder Questionnaire; SWB: Subjective Well Being Scale. Time 1 administered post-birth before expressive writing; Time 2 administered post-birth after expressive writing; Time 3 administered at 6-week follow-up before expressive writing; Time 4 administered at 6-week follow-up after expressive writing; Time 5 administered at 9-week follow-up. Due to different scales for each variable, standardized scores are displayed.
Figure 3

Expressive Writing Outcomes of Distressed Participants

Note. OQ 45.2: Outcome Questionnaire 45.2; PPQ: Perinatal Posttraumatic Stress Disorder Questionnaire; SWB: Subjective Well Being Scale. Time 1 administered post-birth before expressive writing; Time 2 administered post-birth after expressive writing; Time 3 administered at 6-week follow-up before expressive writing; Time 4 administered at 6-week follow-up after expressive writing; Time 5 administered at 9-week follow-up. Due to different scales for each variable, standardized scores are displayed.
APPENDIX A

UNIVERSITY OF NORTH TEXAS INSTITUTIONAL REVIEW BOARD APPROVAL
Supervising Investigator: Dr. Jennifer Callahan
Student Investigator: Beth Janis
Department of Psychology
University of North Texas

Re: Human Subjects Application No. 14105

Dear Dr. Callahan:

As permitted by federal law and regulations governing the use of human subjects in research projects (45 CFR 46), the UNT Institutional Review Board has reviewed your proposed project titled “Perinatal Stress: Predictors and Outcomes.” The risks inherent in this research are minimal, and the potential benefits to the subject outweigh those risks. The submitted protocol is hereby approved for the use of human subjects in this study. Federal Policy 45 CFR 46.109(e) stipulates that IRB approval is for one year only, May 15, 2014 to May 14, 2015.

Enclosed is the consent document with stamped IRB approval. Please copy and use this form only for your study subjects.

It is your responsibility according to U.S. Department of Health and Human Services regulations to submit annual and terminal progress reports to the IRB for this project. The IRB must also review this project prior to any modifications. If continuing review is not granted before May 14, 2015, IRB approval of this research expires on that date.

Please contact Shelia Bourns, Research Compliance Analyst, at extension 2018 if you wish to make changes or need additional information.

Sincerely,

Patricia L. Kaminski, Ph.D.
Associate Professor
Department of Psychology
Chair, Institutional Review Board

PK/sb
APPENDIX B

UNIVERSITY OF NORTH TEXAS INSTITUTIONAL REVIEW BOARD

INFORMED CONSENT NOTICE
University of North Texas Institutional Review Board

Informed Consent Notice

Before agreeing to participate in this research study, it is important that you read and understand the following explanation of the purpose, benefits and risks of the study and how it will be conducted.

Title of Study: Perinatal Stress: Predictors and Outcomes

Supervising Investigator: Jennifer L. Callahan, Ph.D., ABPP, University of North Texas (UNT) Department of Psychology.

Student Investigator: Beth Janis, B.A., University of North Texas (UNT) Department of Psychology.

Purpose of the Study: You are being asked to participate in a research study which involves responding to questions about pregnancy, childbirth, and the emotional or behavioral reactions people may experience as a result of pregnancy and childbirth.

Study Procedures: You will be asked to complete four surveys. The first survey is attached and will require less than 2 hours to complete. You do not need to complete the entire survey at one time, but we would like you to complete it within a couple of days. The second survey will be requested of you within the first week following childbirth. The third survey will be requested approximately 6 weeks after childbirth, and the fourth survey will be requested approximately 9 weeks after childbirth. The second and third surveys will require no more than 1 hour each, and the fourth survey will require approximately 10 minutes.

Foreseeable Risks: No foreseeable risks are involved in this study.

Benefits to the Subjects or Others: Some people may experience an improved sense of well-being as a function of participating in this study. More generally, the information resulting from this study may aid in understanding how the stressors of pregnancy and childbirth may be best managed.

Compensation for Participants: In exchange for participation, $1 will be paid upon completion of the first survey. We will offer participants who complete the second survey a care package as an expression of our appreciation. Those participants that finish the study by completing the third survey will be entered to win one of one $300.00 gift card. Participants will also be entered to win one of one $300.00 gift card for completion of the follow-up (survey number 4). The odds of winning each drawing are 1 in 116.

Procedures for Maintaining Confidentiality of Research Records: Please note that data obtained from this study will be kept strictly confidential. Any data you submit will be coded without identifying information. Your data will be entered into an electronic database and the paper records will be shredded. The electronic data will be protected by password on a
controlled access computer. The confidentiality of your individual information will also be
maintained in any publications or presentations regarding this study.

Questions about the Study: If you have any questions about the study, you may
contact Beth Janis at bethjanis@mv.unt.edu or (940) 448-0868 OR Dr. Jennifer
Callahan at jennifer.callahan@unt.edu (940) 369-8229.

Review for the Protection of Participants: This research study has been
reviewed and approved by the UNT Institutional Review Board (IRB). The UNT
IRB can be contacted at (940) 565-3940 with any questions regarding the rights of
research subjects.

Research Participants’ Rights:

Your participation in the survey confirms that you have read all of the above and
that you agree to all of the following:

- The study has been explained to you and you have had an opportunity to
  contact the investigators with any questions about the study. You have
  been informed of the possible benefits and the potential risks of the study.
- You understand that you do not have to take part in this study, and your
  refusal to participate or your decision to withdraw will involve no penalty
  or loss of rights or benefits. The study personnel may choose to stop your
  participation at any time.
- You understand why the study is being conducted and how it will be
  performed.
- You understand your rights as a research participant and you voluntarily
  consent to participate in this study.
- You understand you may print a copy of this form for your records.

Consent: The completion of this survey indicates that you are at least 18 years of age and
consent to participate in this project. If you are not at least 18 years of age, please do not
proceed further.
REFERENCES


emotional distress in mothers of high-risk infants. *Journal of Clinical Psychology, 56*, 89-100. doi: 10.1002/(SICI)1097-4679(200001)56:1<89::AID-JCLP8>3.0.CO;2-6


Rush, A. J., Bernstein, I. H., Trivedi, M. H., Carmody, T. J., Wisniewski, S., Mundt, J. C.,


