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FACTOR STRUCTURE AND RISK OF PERINATAL POSTTRAUMATIC STRESS
DISORDER

by

Rebecca Grekin

A thesis submitted in partial fulfillment
of the requirements for the Doctor of Philosophy
degree in Psychology in the
Graduate College of
The University of Iowa

December 2017

Thesis Supervisor: Professor Michael W. O'Hara

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CERTIFICATE OF APPROVAL

PH.D. THESIS

This is to certify that the Ph.D. thesis of

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ABSTRACT

Existing research suggests that childbirth may be a significant trigger of posttraumatic stress disorder (PTSD) in the postpartum period. While literature presents important results regarding the prevalence and risk factors of postpartum PTSD, several gaps remain. The current study examined the factor structure of perinatal PTSD by comparing two supported structures of PTSD. Additionally, structural equation modeling (SEM) was used to examine whether subjective birthing experiences and objective childbirth characteristics mediated the relationship between psychosocial variables (history of trauma, fear of childbirth, and social support) and postpartum PTSD.

Women were recruited during pregnancy from the University of Iowa Hospitals and Clinics. Symptoms of PTSD, OCD, and depression, as well as risk factors for postpartum PTSD were measured at pregnancy, 4, 8, and 12 weeks postpartum. Additionally, structured clinical interviews were conducted to assess for depression, PTSD, OCD, and mania.

Five factor structures were examined using confirmatory factor analysis, including two four factor models with correlated latent factors, two four factor hierarchical models, and a unidimensional model. All models resulted in adequate global fit and excellent component fit. The most parsimonious model, the unidimensional model was retained. The SEM showed that subjective perceptions of childbirth mediated the relationship between fear of childbirth and postpartum PTSD at 4 weeks postpartum. At 8 weeks postpartum, objective childbirth characteristics mediated the relationship between fear of childbirth and postpartum PTSD and there was a direct relationship between fear of childbirth and postpartum PTSD.

The current study supports a hierarchical or unidimensional structure of PTSD in perinatal samples emphasizing the importance of a higher-order, shared dimension of PTSD symptoms. It further emphasizes the importance of fear of childbirth and both subjective and objective birthing experiences in predicting postpartum psychopathology. Future research should examine these symptoms and risk factors in a more diverse and at-risk sample. Additionally, accurate assessments, and influential interventions for postpartum PTSD should be further examined.

PUBLIC ABSTRACT

Childbirth is a significant cause of posttraumatic stress disorder (PTSD). Research presents results regarding the prevalence and risk of postpartum PTSD, though several gaps remain. The current study examined the factor structure of perinatal PTSD. Additionally, a model examined the relationships between objective and subjective birthing characteristics, psychosocial variables (history of trauma, fear of childbirth, and social support) and postpartum PTSD.

Women were recruited from the University of Iowa Hospitals and Clinics. Symptoms of PTSD, OCD, and depression as well as risk factors for postpartum PTSD were measured at pregnancy, 4, 8, and 12 weeks postpartum. Additionally, structured interviews were conducted to assess for depression, PTSD, OCD, and mania.

Five factor structures were examined at each time point. All models resulted in adequate global fit and component fit. The most parsimonious model, the unidimensional model was retained. The model of risk showed that subjective perceptions of childbirth mediated the relationship between fear of childbirth and postpartum PTSD at 4 weeks postpartum. At 8 weeks postpartum, objective childbirth characteristics mediated the relationship between fear of childbirth and postpartum PTSD and there was a direct relationship between fear of childbirth and postpartum PTSD.

The current study emphasizes the shared dimension of PTSD symptoms in perinatal samples. It further supports the importance of fear of childbirth, subjective and objective birthing experiences in predicting postpartum mental health. Future research should examine symptoms and risk factors in diverse and at-risk samples. Additionally, accurate assessment measures, and influential interventions for postpartum PTSD should be examined.

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CHAPTER ONE: INTRODUCTION

The consequences of Post-Traumatic Stress Disorder (PTSD) for women are significant and detrimental to overall health and well-being. These consequences not only include psychological symptoms such as over-alertness and emotional numbing, but also trigger negative health behaviors (Breslau, Davis, Peterson & Schultz, 1997). In addition, women who suffer from PTSD are also more likely to experience comorbid depression and anxiety (Morland et al., 2007). Recent research suggests that childbirth may be a significant trigger of PTSD in women (Garthus-Niegel, Soest, Vollrath, & Eberhard-Gran, 2013; Goutaudier, Sejourne, Rousett, Lami, & Chabrol, 2012; Seng, et al., 2013; Verreault, et al., 2012). Prevalence rates and risk factors of postpartum PTSD were explored in a recent meta-analysis (Grekin & O'Hara, 2014). Among community samples of postpartum women, prevalence of postpartum PTSD was calculated to be 3.1% and among samples from targeted or at-risk groups the prevalence was calculated to be 15.7%. For community samples, the greatest risk factors for PTSD included postpartum depression, experiences during delivery and a history of psychopathology before or during pregnancy. For targeted samples (e.g., women with existing psychopathology, pregnancy complications, etc.), risk factors included postpartum depression as well as maternal and infant complications.

Although the Grekin and O'Hara meta-analysis provides important information on prevalence and predictors of postpartum PTSD, there are many questions left unanswered. Few studies have followed the longitudinal trajectory of postpartum PTSD, which makes it difficult to clearly identify the specific trauma causing the PTSD symptoms. Many have assumed that postpartum PTSD is invariably caused by traumatic experiences during childbirth, but few researchers have actually distinguished between women who already had PTSD during pregnancy, those that may be experiencing symptoms due to another trauma, and those that experienced a traumatic childbirth (Seng et al., 2013). Additionally, Grekin and O'Hara identify postpartum depressive symptoms as being highly correlated with postpartum PTSD. It is

important to consider what this may mean in terms of the structure of postpartum PTSD and its distinctiveness from other psychiatric disorders and postpartum specific disorders. Finally, as Grekin and O'Hara indicate, it is somewhat misleading to evaluate risk factors independently of one another. It is important to consider multivariate relationships among these risk factors with postpartum PTSD.

The current study aimed to address these questions by following women from pregnancy through the third month postpartum. In order to better understand the hallmark symptoms of the disorder in the postpartum period, the structure of postpartum PTSD was examined. Confirmatory factor analysis was used to examine the structure of postpartum PTSD using existing supported structures of PTSD in broader populations (e.g., King, Leskin, King, & Weathers, 1998; Simms, Watson, & Doebbeling, 2002). A mediation model was tested to determine whether objective and subjective experiences in childbirth mediate the relationship between impactful psychosocial risk factors and postpartum PTSD. The model was further examined for its specificity in predicting PTSD by including as covariates, symptoms of two highly comorbid and often overlapping disorders, obsessive compulsive disorder and depression. The results help to reveal whether the supported model is uniquely predictive of PTSD or instead the shared features of these disorders.

Postpartum Posttraumatic Stress Disorder

Complexity of the Stressor Criterion

Although studies of postpartum PTSD have illuminated and drawn attention to this phenomenon, PTSD presents a complex and unique area of research in relation to other disorders, particularly in the postpartum period. This complexity is due to the “stressor” criterion, which has been a requirement for a PTSD diagnosis since it first appeared in the DSM-III (American Psychiatric Association, 1980). The vast majority of postpartum PTSD research has occurred in the past twenty years and, therefore, has utilized the stressor criterion as defined by the DSM-IV and DSM-IV-TR (American Psychiatric Association, 1994; 2000). In DSM-IV and DSM-IV-TR, criterion A was defined as “the person

experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others” and “the person’s response involved intense fear, helplessness, or horror” (APA, 2000, p. 467).

In research focusing on PTSD in the postpartum period, different paths to PTSD have emerged in regards to the stressor criterion. The first path includes women who identify childbirth as traumatic and subsequently develop PTSD symptoms due to this experience. Within this group, women often will have had unexpected interventions during labor and delivery such as emergency cesarean sections or vacuum assisted vaginal deliveries. In other cases, women may have felt a loss of control, felt that they were not fully informed about the process of childbirth or may have experienced extreme pain and subsequently label childbirth as traumatic. In these cases, women may develop PTSD symptoms that are specifically related to childbirth. For example, symptoms might include nightmares about the childbirth or a mother’s reluctance to engage with her infant or bring her infant to the hospital where she delivered.

The second path includes previous traumatic events that are not related to the perinatal period as the cause of PTSD symptoms, events like childhood sexual abuse, rape or physical assault. Among these women it is likely that PTSD symptoms were present before childbirth and simply continued into the postpartum period. It is also possible that the symptoms had resolved but were retriggered following childbirth.

Investigators have not consistently distinguished among these different paths to PTSD in the postpartum period (Onoye, Goebert, Morland, & Matsu, 2009; Sumner, Wong Schetter, Myers, & Rodriguez, 2012; Tham, Christensson, & Ryding, 2007). Indeed, many studies fail to clearly identify the stressor criterion and investigators simply assume that PTSD symptoms are due to childbirth because the symptoms are measured after childbirth. In Grekin and O’Hara (2014), the stressor criterion was explored as a moderator among risk factors and prevalence. However, because individual studies have not consistently made this distinction, the meta-analysis only included studies in the moderator analyses

that explicitly evaluated childbirth as criterion A versus those that did not. The meta-analysis demonstrated that the association between history of trauma and postpartum PTSD was moderated by criterion A wherein the association was larger for postpartum PTSD not due to childbirth than postpartum PTSD due to childbirth. The studies that did not specify a traumatic stressor include a variety of stressors that likely also include childbirth. In Grekin and O'Hara (2014) 33 out of the 78 studies meeting inclusion criteria for the meta-analysis did not specify a criterion A. Hence it is important to begin to consistently distinguish these paths to PTSD in studies of postpartum PTSD going forward.

Posttraumatic Stress Disorder Due to Childbirth

Much of the research conducted on PTSD in the postpartum period focuses on PTSD that is assumed to be specifically due to the experiences of childbirth. According to a recent study (Alcorn, O'Donovan, Patrick, Creedy, & Devilly, 2010) approximately 43% of recently delivered women met the requirements for the DSM-IV-TR PTSD Criterion A (APA, 2000) in terms of their appraisal of childbirth as a traumatic event. A small proportion of these women, 3.6% of the sample, went on to meet full criteria for PTSD. In community samples a majority of studies report that 1 to 5% of the women in their samples meet criteria for PTSD due to childbirth. As expected, studies that target at-risk samples report relatively larger percentages of women meeting full criteria for PTSD due to childbirth, often more than 10% of women. "At-risk" samples include a variety of different characteristics such as maternal psychiatric history, history of trauma and adverse perinatal factors such as fear of childbirth, preterm birth and preeclampsia (Feeley et al., 2011; Ryding, Persson, Onell, & Kvist, 2003; Shaw, Bernard, Storfer-Isser, Rhine, & Horwitz, 2013).

Studies have shown that women's subjective experiences during labor and delivery are strongly associated with the development of PTSD due to childbirth (Czarnocka & Slade, 2000; Olde et al., 2005; Verrault et al., 2012). It is important to note that this may be and often is different from a medical provider's assessment of the childbirth experience. A woman may go through a delivery that a physician labels as "normal" while the woman assesses her experience as traumatic. Additionally, it is not clear if

there are physician behaviors that will invariably cause women to label their childbirth as traumatic, or if women who have particular characteristics like existing psychopathology or poor social support are more likely to evaluate their childbirth as a negative experience and subsequently develop PTSD symptoms.

These subjective experiences as well as objective characteristics of the event are particularly important in their connection with PTSD. Researchers of PTSD in the postpartum period and in more general populations have shown that subjective appraisals of the traumatic experience are often the most impactful risk factors for PTSD symptoms. In a meta-analysis of risk factors for PTSD in adults, Ozer, Best, Lipsey, and Weiss (2003) demonstrated that the subjective experience of the event (e.g. perceived life threat) was highly associated with PTSD, above and beyond individual characteristics like existing psychopathology. In a perinatal sample, Garthus-Niegel et al. (2013) found that subjective experiences during labor and objective characteristics mediated the relationship between fear of childbirth and pregnancy psychopathology, and postpartum PTSD. Therefore, subjective appraisals of an experience or childbirth more specifically, seem to play a central role in predicting PTSD symptoms.

Not surprisingly, women are more likely to label their birth as traumatic if emergency procedures and interventions are performed during delivery. These experiences are robust predictors of PTSD due to childbirth (Leeds & Hargreaves, 2008). Similarly, complications such as hospitalization and hyperemesis during pregnancy often predict postpartum PTSD (Maggioni, Margola, & Filippi, 2006; Polacheck, Harari, Baum, & Strous, 2012). Other risk factors that have demonstrated significant associations with PTSD due to childbirth include a history of previous psychiatric disorders, exhibiting psychiatric symptoms during pregnancy as well as an existing history of trauma (Cohen, Ansara, Schei, Stuckless, & Stewart, 2004; Garthus-Niegel et al., 2013). Demographic variables, however, have been inconsistently associated with postpartum PTSD. Single relationship status (Davies, Slade, Wright, & Stewart, 2008; Wijma, Soderquist, & Wijma, 1997) and age (Iles, Slade, & Spiby, 2011; Stramrood et al., 2011) both show significant and non-significant associations with postpartum PTSD across a variety of studies.

However, education level is rarely associated with postpartum PTSD (Adewuya, Ologun, & Ibigbami, 2006).

Posttraumatic Stress Disorder in the Postpartum Period

Researchers also evaluate PTSD in postpartum women who identify a variety of events that qualify as the stressor criterion. These traumatic events may include rape, childhood sexual abuse, motor vehicle accidents and other commonly identified events that cause PTSD symptoms. Notably, it is possible that some women in these groups do identify childbirth as the stressor, but it is impossible to identify these women from the data that are reported. Although the types of traumatic events identified by women may be reported, researchers often do not make this distinction when reporting prevalence rates and risk factors. Therefore, this group of women (which includes childbirth-related and non-childbirth-related traumatic events) is not mutually exclusive from community and targeted groups experiencing PTSD specifically due to childbirth.

Community samples of postpartum women show prevalence rates between 2 to 9% (Cerulli, Talbot, Tang, & Chaudron, 2011; Onoye et al., 2009), while research on targeted groups consistently report prevalence rates greater than 15% for PTSD (Ammerman, Putnam, Chard, Stevens, & Van Ginkel, 2012; Enlow, et al., 20011; Harville, Xiong, Prdjian, Elkind-Hrisch, & Beukens, 2009). Risk factors found to be significant predictors of PTSD in the postpartum period in both targeted and community samples include concurrent depression (Armstrong, Hutti, & Myers, 2009), history of trauma (Ammerman, et al., 2012), previous psychopathology (Seng, et al., 2013) and lack of social support during pregnancy and in the postpartum period (Sumner et al., 2012).

Structure of Posttraumatic Stress Disorder

Investigations of prevalence and risk factors of a disorder are important but only allow for a somewhat superficial understanding of a disorder. It is also necessary to evaluate the structure of symptoms. Understanding the structure of PTSD is helpful because it lends itself to a deeper

understanding of the disorder, the symptoms that are indicative of that disorder and our ability to accurately assess, diagnose and treat the disorder (King et al., 1998; Palmieri & Fitzgerald, 2005; Simms et al., 2002). Understandably, this is important in any population, but one may argue the increased importance and complexity in a sample of postpartum women, who experience a broad range of physical, emotional and hormonal changes that may manifest as symptoms of mood and anxiety disorders (Williamson, O'Hara, Stuart, Hart, & Watson, 2015).

The structure of PTSD has been investigated by many researchers across sample and trauma types, though not within perinatal samples. Two similar models (King et al., 1998; Simms et al., 2002) have been widely supported across individual studies and a recent meta-analytic factor analysis (Yufik & Simms 2010). The model proposed by King et al. (1998) is a four factor, first order model with re-experiencing, avoidance, emotional numbing and hyperarousal as distinct but correlated factors. Simms et al. (2002) presented a slightly different four-factor, first order model that included re-experiencing, avoidance, dysphoria and hyperarousal components. This model combines emotional numbing symptoms with several hyperarousal symptoms to make up the dysphoria factor. The dysphoria factor is understood to represent symptoms that are nonspecific to PTSD and are common among other related and highly comorbid disorders such as depression. Because research on postpartum PTSD is relatively new, no studies have evaluated the factor structure of these symptoms in this specific population. Defining the structure and indicative symptoms of postpartum PTSD allows for a clearer and more in depth understanding of the disorder and a greater ability to more accurately assess and diagnose the disorder.

PTSD, Depression and OCD

Postpartum Depression and PTSD

Postpartum depression (PPD) is the most studied perinatal disorder to date. In a recent comprehensive review on postpartum depression (O'Hara & McCabe, 2013), its prevalence was estimated to be between 13 and 19% of all postpartum women. Many studies suggest that PPD impacts not only the

mother but her children as well. Women who suffer from PPD are at increased risk for subsequent psychopathology, social isolation and marital discord (Letourneau et al., 2012). Additionally, their children are often more susceptible to later psychopathology (Goodman et al., 2011) and problems with cognitive and emotional growth (Beck, 1998).

Grekin and O'Hara (2014) found that postpartum depressive symptoms demonstrated the strongest association with postpartum PTSD in both targeted and community samples. It is important to consider what this may mean in terms of the structure of postpartum PTSD and its distinctiveness from other psychiatric disorders and postpartum specific disorders. Depressive and anxious symptoms are highly correlated in postpartum and non-postpartum samples (Field et al., 2010; Pollack, 2005; Reck et al., 2008). More specifically, symptoms of PTSD and major depression are highly correlated. Measures of hyperarousal and numbing symptom clusters within the PTSD criteria tend to correlate highly with measures of depression (Watson, 2009). The fact that depression and PTSD overlap to this extent prompts discussion of the limitations regarding symptom measurement in the postpartum PTSD literature.

A majority of the studies included in the existing literature use self-report measures to diagnose participants with PTSD. Though many of the measures that are used in this research are validated against clinical interviews for PTSD, self-report measures are not created to make diagnoses (Slade, 2006). Further, it is possible that participants are endorsing PTSD symptoms that are more likely to overlap with symptoms of depression than symptoms that are specific and unique to PTSD. Symptoms like loss of interest in pleasurable activities, detachment from others and difficulty with sleep are all indicators of both depression and PTSD. This problem is compounded by the fact that many studies will simply use a cut-off score on a self-report scale and not confirm Criterion A (APA, 2013) but still report a prevalence of PTSD. For example, self-report measures such as the Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979) and the Posttraumatic Stress Disorder Checklist-Civilian Version (PCL-CV; Weathers et al., 2013) measure symptoms of PTSD but they do not assess for criterion A. However, even though researchers do not assess for criterion A, they still use a cut-off score to “diagnose” PTSD not just in

postpartum PTSD research, but in the broader PTSD literature as well. It is likely that in the cases in which Criterion A is not established and cut-off scores are used for prevalence estimates on self-report measures, cases may be misdiagnosed as PTSD when women are actually experiencing other related internalizing disorders, like postpartum depression. Understandably, use of clinical assessment like the Structured Clinical Interview for DSM-IV Diagnoses (First, Spitzer, Gibbon, & Williams, 1996) or use of self-report measures that do assess for criterion A like the Posttraumatic Stress Disorder Diagnostic Scale (PDS; Foa, Cashman, Jaycox, & Perry, 1997) may provide more accurate estimates of prevalence in study populations and may allow for a better distinction of PTSD from related disorders like depression and obsessive-compulsive disorder (OCD).

In addition to symptom overlap, PTSD and major depression are highly comorbid with one another (Ginzburg, Ein-Dor, & Solomon, 2010; Shalev et al., 1998). In fact, these disorders are so highly and consistently comorbid with one another that some researchers believe there should be a post-traumatic mood disorder that encapsulates and accounts for the overlapping symptoms of PTSD and major depression (Sher, 2005). It is also the case that postpartum PTSD and postpartum depression are highly comorbid with one another (Onoye et al., 2009; White, Matthey, Boyd, & Barnett, 2006; Zaers, Waschke, & Ehlert, 2008).

Commonalities between postpartum depression and postpartum PTSD are also seen in the similarities among risk factors for both disorders. O'Hara and Swain (1996) conducted a meta-analysis regarding predictors and prevalence of postpartum depression and measured constructs similar to what were evaluated in Grekin and O'Hara (2014). The strengths of association between numerous risk factors (including lack of social support, prenatal psychopathology, life stressors [which can be somewhat equated with a history of trauma], and previous psychopathology) and postpartum depression and postpartum PTSD were all similar if not nearly identical in the two meta-analyses.

Postpartum OCD and PTSD

Like postpartum PTSD, postpartum OCD is a relatively newly researched phenomenon. Several researchers have found that obsessive-compulsive *symptoms* (OCS) are quite common among postpartum women (Fairbrother & Woody, 2008; Jenning & Pepper, 1999; Wisner, Peindl, Gigliotti, & Hanusa, 1999; Zambaldi et al., 2009). For example, a recent study demonstrated that 63.5% of a postpartum sample reported OCS, including both obsessions and compulsions (Zambaldi et al., 2009). The most frequently occurring obsessions included harming the infant and compulsions often included washing, cleaning and checking. Though many women endorse experiencing these thoughts and feel distress because of these thoughts, a much smaller proportion of women meet full criteria for OCD. In Zambaldi et al. (2009), 9% of the postpartum sample met full criteria for the disorder. OCD is important to explore in postpartum specific samples because research has consistently demonstrated that pregnant and postpartum women are 1.5-2 times more likely to experience OCD than men and non-perinatal women (Russell, Fawcett, & Mazmanian, 2013).

Although not specifically evaluated in perinatal samples, researchers find a unique association between OCD and PTSD (de Silva & Marks, 2001; Huppert et al., 2005; Merrill, Gershuny, Baer, & Jenike, 2011; Nacasch, Fostic, & Zohar, 2011). On a basic level, high rates of comorbidity between the two disorders have been noted. For example, Nacasch et al. (2011) found that 41% of a sample of posttraumatic stress disorder patients also met criteria for OCD. Because both diagnoses are anxiety disorders, this fact is not surprising. However, there may be more complex reasons for why these disorders are so highly comorbid with one another. Symptom overlap between PTSD and OCD has often been cited as an explanation for the associations demonstrated between these two disorders (Huppert et al., 2005; Merrill et al., 2011). These symptoms include cognitive intrusions as well as avoidance of thoughts, activities or people that may trigger the unwanted intrusions. In the DSM-5, intrusions are described in the OCD diagnosis as “recurrent and persistent thoughts, urges, or images that are experienced, . . . , as intrusive and unwanted, and that in most individuals cause marked anxiety or distress”

(APA, 2013, p. 237). A very similar description defines intrusions regarding a PTSD diagnosis. In OCD these obsessions and intrusions are unique to the person and may include thoughts about disgust, cleanliness, and for postpartum specific samples, thoughts regarding the baby, such as obsessions about harming their infant or compulsions surrounding checking their infant because of excessive safety concerns (Speisman, Storch, & Abramowitz, 2011). In PTSD, intrusions are often related to whatever traumatic event spurred the PTSD symptoms, but may also generalize to other scenes that remind the person of the traumatic event as the disorder becomes more chronic (O'Donnell et al., 2007).

Researchers have posited that some patients may develop obsessions or compulsions related to OCD in response to uncomfortable PTSD symptoms. Patients may begin to practice behavioral or cognitive rituals in order to neutralize uncomfortable emotions spurred by PTSD (Gershuny, Baer, Radomsky, Wilson, & Jenike, 2003; Gershuny, Baer, Jenike, Minichiello, & Wilhelm, 2002). This has been emphasized in case series reports on treatment resistant patients with both OCD and PTSD. Gershuny et al. (2002) presented data on patients with comorbid PTSD and OCD who were also treatment resistant for OCD. Among these patients, decreases in OCD-specific symptoms were associated with increases in PTSD-specific symptoms, whereas decreases in PTSD-specific symptoms were related to increases in OCD-specific symptoms. Gershuny et al. (2002) posited that this association may be indicative of patients using OCD-related rituals to neutralize PTSD symptoms. Cromer, Schmidt, and Murphy (2007) demonstrated a similar finding in investigating the association between compulsive hoarding and history of trauma. Cromer et al. (2007) found a significant association between compulsive hoarding and experiences of traumatic life events in college students. Although they did not measure PTSD, one can imagine applying a similar theory to this sample. It is possible that individuals are using compulsive hoarding to neutralize undiagnosed PTSD symptoms related to their history of trauma. The high rates of comorbidity and overlapping symptoms among OCD and PTSD make distinguishing, assessing and diagnosing these disorders quite complex. There may be even further complexity when

considering these disorders in a postpartum sample, in which most women experience changes in hormone levels, sleep disruption, and mood fluctuation.

In addition to high comorbidity and symptom overlap, research has begun to emerge regarding the relationship between trauma exposure and the development of OCD. Many researchers agree that the experience of stressful life events may put patients at risk for a variety of psychopathology, however, *traumatic* life events have been shown to spur more specific types of psychopathology, not only PTSD but OCD as well. Across studies, researchers have found high rates of traumatic events experienced among patients diagnosed with OCD (Cromer et al., 2007), as well as associations between childhood trauma, particularly emotional abuse, and the onset of OCD (Matthews, Kaur, & Stein, 2008). Research has yet to reveal what factors may affect whether a person develops OCD, PTSD or other psychopathology after experiencing a traumatic life event, or a combination of disorders. However, these additional parallels introduce yet another reason for a more in depth understanding in a postpartum sample.

Finally, as with postpartum PTSD and postpartum depression, postpartum OCD and postpartum PTSD share similar risk factors as well. Although research is still establishing robust predictors of postpartum OCD, studies have demonstrated that OCD is more likely in women with a history of psychiatric disorders, concurrent postpartum depression and perinatal complications such as preterm birth and cesarean section (Maina, Albert, Bogetto, Vaschetto, & Ravizza, 1999; Zambaldi et al., 2009). These are all factors that Grekin and O'Hara (2014) found to have medium to large associations with postpartum PTSD.

Postpartum PTSD, OCD and Depression

Not only do bivariate relationships exist between PTSD and OCD and PTSD and depression, but several studies have demonstrated multivariate relationships among the three disorders. For example, Merrill et al. (2011) evaluated the associations between PTSD and depression in patients seeking treatment for OCD. The study demonstrated that PTSD and depression independently predicted OCD

symptoms. However, when depression and PTSD were entered into the model together, the relationship between OCD and PTSD was no longer significant, indicating that depression mediated the relationship between PTSD and OCD. Further, researchers concluded that OCD symptoms, like behavioral and cognitive rituals, might be used to cope with both depressive symptoms and PTSD symptoms. Merrill et al. (2011) further discussed how rumination may be the feature that links these disorders. Rumination may be used to cope with depressive symptoms and this also fits well with OCD and PTSD in which patients also have repetitive and intrusive thoughts. A ruminative cognitive style may be a shared trait among patients with all three disorders.

Findings similar to Gershuny et al. (2002; 2003) were obtained in a dimensional study of symptoms of OCD, PTSD and depression among four groups: patients seeking treatment for 1) OCD, 2) PTSD, 3) other anxiety disorders and 4) college students (Huppert et al., 2005). In the groups of patients diagnosed with OCD or PTSD, symptoms specific to each of these disorders were no longer associated when accounting for symptoms of depression. Therefore, in samples with diagnoses of OCD and PTSD, relationships can be attributed to overlapping symptoms and existence of depression. However, in college students and patients with other anxiety disorder diagnoses, all symptoms remained significantly correlated with one another even after controlling for depressive symptoms and overlapping symptoms. Huppert et al. interpreted these results to indicate that for those who do not meet criteria for either PTSD or OCD, the relationship between these symptoms may be due to an underlying factor that is common to anxiety disorders or general anxiety symptoms such as trait anxiety. However, once an individual meets criteria for PTSD or OCD, the associations between these disorders may be due to other factors like limited distress tolerance.

Limitations of Existing Literature

The existing research regarding risk factors, prevalence and causes of postpartum PTSD, though illuminating, is lacking in several important areas. First, studying risk factors independently of one

another can be misleading. Reporting results in this way does not help to illuminate possible mechanisms of these relationships. Findings like these have been presented in individual studies in which mediator relationships between specific variables and postpartum PTSD were explored. For example, Garthus-Niegel et al. (2013) tested a model with subjective and objective birth experiences mediating the association between ante-partum predisposing factors including preexisting PTSD, fear of childbirth, and symptoms of depression and anxiety. Preexisting psychopathology had unique associations with postpartum PTSD, however, some of the variance was accounted for by the association between objective and subjective birth experiences and postpartum PTSD. Additionally, objective and subjective birth experiences mediated the association between fear of childbirth and postpartum PTSD. This study clearly illustrates the complexities of evaluating an array of risk factors for a psychological disorder and how a complete understanding of the true association between variables can only be achieved when exploring multivariate relationships among the risk factors and outcomes.

To date, Garthus-Niegel et al. is the only study that has investigated a mediator relationship in predicting postpartum PTSD. As symptoms of PTSD are thought to be caused by experience of a traumatic event, the subjective perceptions of that experience as well as the objective nature of the event have been shown to be highly related to PTSD symptoms (Ozer et al., 2003). Therefore, it is likely that these variables are the specific mechanism through which other, more general risk factors are related to postpartum PTSD, in addition to what Garthus-Niegel et al. (2013) has presented.

Second, a vast majority of studies use self-report measures to diagnose postpartum PTSD. Use of self-report measures for diagnosis of PTSD spurs questions surrounding the definition of the “trauma” in postpartum PTSD research. Some studies have been careful to establish a criterion A (Ammerman, et al., 2012; Sawyer & Ayers, 2009; Seng, et al., 2013; Zambaldi, Cantilino, & Sougey, 2011), but many have not (Armstrong et al., 2009; Lefkowitz, Baxt, & Evans, 2010; Onoye et al., 2009; Sumner et al., 2012). Further, for those studies that did not establish a traumatic event in accordance with DSM criteria (APA, 2013), it is possible that the symptoms measured were indicative of a different disorder such as

depression or OCD because of symptom overlap between these disorders (Watson, 2009). Without using clinical assessment, researchers are likely overestimating prevalence rates when exclusively basing these rates on results from self-report measures.

Finally, the reviewed literature emphasizes the complex nature of PTSD, especially as it relates to other similar disorders including depression and OCD. Perinatal samples naturally present with significant fatigue, changes in sleep patterns, appetite and mood that are somewhat expected during this transitional period. Therefore, it makes it difficult to disentangle these normal changes from pathological symptoms that may be associated with different mental disorders. Disentangling normal postpartum changes from symptoms associated with psychopathology has been addressed in postpartum depression specifically (Williamson et al., 2015), but no discussion exists within studies of postpartum PTSD.

In a similar vein, although countless studies have evaluated the factor structure of PTSD across more traditional trauma samples such as war veterans and injured patients, none have done so in a postpartum sample. This limits our ability to identify what symptoms are indicative of the disorder and how it differs from related disorders discussed previously. Further, the parallels between these diagnoses present complications in accurately diagnosing PTSD in the postpartum period, which further hinders the field from correctly identifying women in need.

These limitations in the current research call for studies that use clinical assessment to identify cases of postpartum PTSD, model multivariate relationships between risk factors and outcomes, robustly identify the nature and timing of the traumatic stressor and evaluate the factor structure of postpartum PTSD. Accounting for all of these factors by following women prospectively from pregnancy through the postpartum period will allow for a deeper and clearer understanding of the causes, course and structure of postpartum PTSD.

Specific Aims of the Current Study

Specific Aim 1- Examine the structure of PTSD

To examine the structure of PTSD during late pregnancy, and the three postpartum time points, I used the items from the PCL-5 to compare supported latent models of PTSD proposed by Simms (Simms et al., 2002; figure 1) and King (King et al., 1998; figure 2). Due to initial results, a total of five models were tested at each time point (table 15); the Simms model with four latent, correlated factors (dysphoria, hyperarousal, avoidance, and re-experiencing), the Simms model with the four latent factors loading onto a higher-order factor, the King model with four latent factors (emotional numbing, hyperarousal, avoidance, and re-experiencing), the King model with the four latent factors loading onto a higher-order factor, and a unidimensional model with all 20 items from the PCL-5 loading onto one latent factor. I hypothesized that the structure of postpartum PTSD would align more closely with Simms' model of PTSD (Simms et al., 2002) than King's model (King et al., 1998).

Specific Aim 2- Examine the relationship among established prenatal risk factors and childbirth specific variables in predicting postpartum PTSD

A multiple mediator model (figure 3) was tested to evaluate whether subjective and objective variables that occur within the labor and delivery experience (subjective experience and objective characteristics) mediate the relationships between predisposing, independent and unrelated, psychosocial risk factors (i.e., trauma history, social support, fear of childbirth) and postpartum PTSD. I hypothesized that subjective perceptions and objective characteristics of labor and delivery would mediate the relationships between all predisposing risk factors and all dimensions of postpartum PTSD at 4 weeks postpartum. At eight and 12 weeks postpartum, the magnitude of indirect effects will lessen with some indirect effects becoming non-significant.

Specific Aim 2.1- Examine the specificity of the model supported in Aim 2 to predicting PTSD

Depression and OCD at corresponding time points were entered as covariates of PTSD. I hypothesized that the supported model in Aim 2 would not be specific to postpartum PTSD, that all pathways would become non-significant, indicating that risk factors are predicting a higher-order dimension of negative affectivity, rather than PTSD specifically.

Specific Aim 3- To clarify “criterion A” in women experiencing postpartum PTSD

Participants were interviewed using the PTSD module from the SCID-5 during pregnancy, and at 4 and 12 weeks postpartum. I hypothesized that a majority of women who met criteria for PTSD in the postpartum period would identify previous, ante-partum traumatic events as the cause of PTSD, whereas a minority would develop PTSD purely due to childbirth experiences.

CHAPTER TWO: RESEARCH DESIGN AND METHODS

Procedures

Recruitment

The University of Iowa Institutional Review board approved all study procedures. The Institute for Clinical and Translational Science¹ provided contact information for all pregnant UIHC patients based on information from electronic medical records. Letters were sent to the identified pregnant women with information regarding the study. Women who were *not* interested in participating in the study were encouraged to call to decline participation. Women who did not call to decline participation one week after the initial letter was sent were contacted via telephone to inquire as to whether they were interested in participating in the study. During this phone call women were given more detailed information about the study and eligibility requirements (over the age of 18; between 28-32 weeks gestational age) were confirmed. Women who were interested in participation were mailed two consent forms (one to return and one to keep). One week following the mailing, women were contacted again by telephone to review the informed consent and confirm interest in participation in the study.

Study Assessments

Participants completed four online assessments (third trimester, 4, 8, and 12 weeks postpartum) and three clinical interviews (third trimester, 4, and 12 weeks postpartum). Study data were collected and managed using REDCap electronic data capture tools hosted at the University of Iowa. REDCap

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(Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources.

Women's expected delivery dates were extracted from their medical records on EPIC. Medical records were checked weekly, beginning at 30 weeks gestation for each woman to identify delivery date and subsequent follow-up dates. Women who did not deliver at UIHC were contacted on their due date via email to inquire as to whether they had delivered. Women received \$15 for completing the time 1, 2 and 4 assessments, and \$10 for completing the time 3 assessment (see table 1 for a complete listing of study time points and assessments).

Measures

All measures are included in the Appendix at the end of the document.

Posttraumatic Stress Disorder Checklist- 5 (PCL-5; Weathers et al., 2013). The PCL-5 is a 20 item self-report measure assessing for symptoms of PTSD. Each item is in accordance with symptom criteria for PTSD in the *Diagnostic and Statistical Manual of Mental Disorders-5* (American Psychiatric Association, 2013). Participants are asked to rate how much they have been experiencing these symptoms over the past month. Ratings are made on a 5 point Likert-type scale (0= not at all to 4= extremely). High internal consistency was reported for the original version of the PCL at .94 (Ruggiero, Ben, Scotti & Rabalais, 2003). Convergent and discriminant validity were also demonstrated by large and significant correlations with an established PTSD measure, the Impact of Events Scale (Horowitz, Wilner, & Alvarez, 1979) and significantly lower correlations with measures of general symptoms (i.e. Symptom Checklist-90 Revised) and depression (i.e. Center for Epidemiological Studies-Depressed Mood Scale; Ruggiero et al., 2003).

Inventory for Depression and Anxiety Symptoms-General Depression Scale (IDAS-GD; Watson et al., 2007). The IDAS-GD scale is a 20 item self-report measure in which participants are asked to rate how they have been feeling during the last two weeks on a 5-point Likert-type scale (1=not at all 2=a little bit 3= moderately 4=quite a bit 5= extremely). Items cover a broad range of symptoms associated with depression such as lassitude, suicidality and appetite loss. For a sample of community adults, coefficient alpha for the IDAS-GD was .92 (Watson et al., 2007). Convergent validity was established in demonstrating strong correlations between the IDAS-GD and Beck Depression Inventory-II and significantly smaller correlations with the Beck Anxiety Inventory (Watson et al., 2007)

Traumatic Life Events Questionnaire (TLEQ; Kubany et al., 2000). The TLEQ is a 23-item self-report measure that asks participants whether or not they have experienced specific events that are in accordance with Criterion A1 of Post-Traumatic Stress Disorder in the *Diagnostic and Statistical Manual of Mental Disorders-5* (American Psychiatric Association, 2013). These items include experiences of physical and sexual assault, warfare, motor vehicle accidents and natural disasters, as well as a general question about experience of any event that was life threatening or caused feelings of intense fear or helplessness. If a participant endorses having experienced a specific event, she is then prompted for the date the event was experienced. One week test-retest reliability (kappa coefficient) was reported to be .4 or higher for 14 out of the 16 types of events and .8 or higher for 8 out of the 16 types of events on the questionnaire (Kubany et al., 2000). Convergent validity was demonstrated via high rates of occurrence agreement between the TLEQ and Traumatic Life Events Interview (Kubany et al., 2000).

During the time of the current study, the University of Iowa Institutional Review board required researchers to report *any* reported abuse of minors to the police, regardless of when it occurred and whether the victim was currently an adult. In order to protect the privacy of the study's participants, the TLEQ was slightly changed so that participants did not report when they experienced traumatic events and were not asked specifically about abuse occurring before 18 years.

Obsessive Compulsive Inventory-Revised (OCI-R; Foa et al., 2002). The OCI-R is an 18 item self-report measure that asks participants to rate how much they have been bothered or distressed by common OCD-like symptoms that fall within one of six subscales: washing, checking, ordering, obsessing, hoarding, and neutralizing. Participants rank their experience over the past month on a 5-point Likert-scale (0=not at all, 5=extremely). The OCI-R has been validated across clinical and non-clinical samples with a high internal consistency of .90 (Foa et al., 2002). Convergent validity is demonstrated through the high association between the OCI-R and a validated measure of OCD (Maudsley Obsessive Compulsive Inventory; Foa et al., 2002).

The Medical Outcomes Social Support Survey (MOS-SS; Sherbourne & Stewart, 1991). The MOS-SS is a 20 item self-report measure that assesses three facets of social support: levels of emotional/informational support, tangible support, positive interaction and affection. The MOS-SS also provides an index of overall support. Subjects rate each question on a 5 point Likert-scale in regards to how often they have experienced each indicator of social support (1=none of the time, 5=all of the time). Internal consistency across subscales is high, ranging from .91-.96, and high for the overall support index with an alpha of .97. Convergent and discriminant validity have been confirmed in explorations of associations with health status surveys that included both physical and emotional health (Sherbourne & Stewart, 1991).

Structured Clinical Interview for DSM-5, Research Version (SCID; First, Williams, Karg, & Spitzer, 2015). The SCID is a semi-structured interview for making DSM-5 Diagnoses. In the current study, the PTSD, OCD, Major Depression and Mania modules will be administered to participants. In the current study, interrater reliability was fair to excellent with Kappas ranging from .662 to 1.00 across SCID-5 modules.

Wijma-Delivery Experiences Questionnaire-A (W-DEQ-A; Wijma, Wijma, & Zar, 1998). The W-DEQ (A) is a 33-item self-report measure that assesses level of fear of childbirth prior to labor and delivery. Participants are asked how they anticipate feeling at different points during labor and delivery

and whether they have fears of their infant being injured during labor and delivery. Participants rank their experiences on a five point Likert-scale. Women who score above 100 have been shown to have “clinical fear of childbirth.” Reliability has been reported to be good with Cronbach’s alphas being reported as .90 or higher. Construct validity of the W-DEQ(A) has been illustrated through highly significant correlations with the childbirth specific Fear Questionnaire (FQ) in both primiparous and multiparous women (Marks & Matthews, 1979; Wijma et al., 1998)

Traumatic Events Scale-B (TES-B; Wijma et al., 1997). The TES-B is 21 item self-report measure that assesses traumatic reaction to childbirth. The questionnaire ends with questions regarding how much and how long these symptoms have affected participants’ daily functioning. Cronbach’s alpha is estimated to be .94 (Wijma et al., 1997).

Peripartum Events Scale (PES; O’Hara, Varner, & Johnson, 1986). The PES is a clinician rated measure that assesses level of perinatal risk based on 11 subscales including demographic, past obstetric history, medical risk factors, obstetric risk factors, indication for admission to labor and delivery, progression labor, method of delivery, duration of labor, fetal monitoring, delivery complications and infant outcome. Inter-rater reliability for the measure has been reported as high with a kappa of .91.

Perceptions of Labour and Delivery Scale (PLDS; Bailham, Slade, & Joseph, 2010). The PLDS is a 15 item, self-report measure that was recently adapted to evaluate three subjective components of labor and delivery: support by staff and feelings of control, pain and distress, and fear for self and baby. Reliability across subscales ranged from .78-.81. Factorial validity was illustrated in Bailham et al. (2010) who used principal component analysis to identify the structure and factors of the measure.

Maternal Breastfeeding Evaluation Scale: Maternal Enjoyment/Role Attainment Subscale (MBFES; Leff, Jefferis, & Gagne, 1994). The maternal breastfeeding evaluation scale is a 30-item self-report measure that assesses mothers’ experiences with breastfeeding across three factors: maternal enjoyment/role attainment, infant satisfaction/growth, and lifestyle/maternal body image. The current study used the 14 item Maternal Enjoyment/Role Attainment subscale. Women are asked to rank their

agreement with each of the items on Likert-type scale from “strongly disagree” to “strongly agree.”

Cronbach alpha for this subscale has been reported at .93 (Leff, Jefferis, & Gagne, 1994).

Data Analyses

Data were analyzed using Mplus 7.4 (Muthen & Muthen, 2015).

Analysis of Specific Aim #1. To evaluate the factor structure of postpartum PTSD, I used confirmatory factor analysis (CFA) to analyze the PCL data. Five models were tested and compared by evaluating both global and component fit. Multiple indices of global model fit were assessed including the chi-square to degrees of freedom ratio (χ^2/df ; Wheaton, Muthen, Alwin, & Summers, 1977), the Comparative Fit Index (CFI; Bentler, 1990), the Tucker-Lewis Index (TLI; Tucker & Lewis, 1973), and the Root Mean Square Error of Approximation (RMSEA; Browne & Cudeck, 1993). Adequate fit is indicated by values lower than 2 on the Chi-Square to degrees of freedom ratio and values greater than or equal to .90 for the CFI/TLI. Values of .05 or less on the RMSEA indicate good fit, while values up to .08 indicate reasonable fit, .08 -.10 indicate mediocre fit and, greater than .10 indicate poor fit (MacCallum, Browne, & Sugawara, 1996). Adequate component fit was evaluated by examining the magnitude and significance of loadings onto latent factors. Factor loadings greater than .30 reflect that items are good indicators of the associated latent factor. Correlations between latent factors in tested models that included more than one latent factor were examined to ensure adequate discriminant validity between latent factors. While latent factors that reflect the same disorder are expected to be significantly correlated with one another, correlations greater than .70 indicate poor discriminant validity and signal the need to collapse two or more latent factors into one.

Missing data due to attrition were addressed via FIML in Mplus (Muthén & Muthén, 2010), which is considered superior to other methods (Enders & Bandalos, 2001).

Analysis of Specific Aim #2. Structural equation modeling was used to test whether labor and delivery specific factors including perception of care in labor and delivery and perinatal complications

mediate the relationship between predisposing psychosocial factors (i.e., social support, history of trauma and fear of childbirth) and postpartum PTSD, controlling for baseline PTSD symptoms (figure 3). Three parallel models were tested at each of the three postpartum time points (4, 8, and 12 weeks postpartum) to determine short-term versus long-term effects of pathways on PTSD dimensions. The model was just-identified, therefore global fit indices are not meaningful and are not reported here. Missing data due to attrition were addressed via FIML.

A bootstrapping approach (Shrout & Bolger, 2002) was used to detect the presence of indirect effects of psychosocial variables on postpartum PTSD via subjective and objective labor and delivery experiences (PLDS and PES scales). Bootstrapping provides an empirical approximation of sampling distributions of indirect effects to produce confidence intervals of estimates. If zero does not fall within the 95% CI, one can conclude that an indirect effect is different from zero.

Analysis of Specific Aim #2.1. The supported model in aim #2 was evaluated for specificity to the features of PTSD. Depression and OCD symptoms at the corresponding time point of assessment of PTSD symptoms (i.e., 4, 8, 12 weeks postpartum) were entered as covariates. This allowed for the examination of whether the pathways of risk are specific to PTSD or instead represent pathways to a higher order shared dimension of negative affect (i.e., Watson, 2009).

Analysis of Specific Aim #3. Frequencies were calculated for each group of women identified in specific Aim #3: women who have a history of or currently meet criteria for PTSD due to another trauma, women who develop PTSD in the postpartum period due to childbirth experiences, and women who do not meet criteria currently and have not met criteria in the past for PTSD.

Exploratory Analyses. A measure of maternal enjoyment/role attainment with breastfeeding was included in the current study to explore possible relationships with prenatal, delivery specific, and postpartum factors. Correlations were explored between all variables and the breastfeeding measure.

CHAPTER THREE: RESULTS

Participant Characteristics

A total of 268 women consented to participate in the study and completed the baseline questionnaire (figure 1). On average, participants were 32 years of age. A majority of participants were white, highly educated, married or cohabitating and of high income levels (table 2.) The sample showed average levels of depression compared to postpartum women (Watson et al., 2007), low levels of OCD symptoms compared to control samples (Foa et al., 2002), and slightly lower levels of PTSD symptoms compared to a trauma-exposed sample (Weathers, Davis, Witte, & Domino, 2015) across time points (table 3). At the baseline assessment, women reported average levels of social support (Sherbourne & Stewart, 1991), low levels of fear of childbirth (Rouhe, Salmela-Aro, Halmesmaki, & Saisto, 2008), and endorsed experiencing about three traumas in their lifetime (table 4).

Results of Specific Aim 1

Item correlations as well as skewness and kurtosis of the PCL were examined at each time point (tables 5-12). Items were mostly correlated, with a few exceptions. Item 16 (*Taking to many risks or doing things that could cause you harm*) was not significantly correlated with several other PCL items, particularly at 4 and 12 weeks postpartum. This item was removed from the CFAs tested at these specific time points. There was significant skew and kurtosis, though this is not surprising given the response scale.

Initially, the Simms and King models were tested at each of the four time points (pregnancy, 4, 8 and 12 weeks postpartum). Across all time points, global fit was good for both models (Model #2 and Model #3 in table 13); however, investigation of component fit showed high correlations among the latent factors (table 14). High correlations ($> .70$) between latent factors suggest poor discriminant validity and indicate that the latent factors are not distinct enough to necessitate the existence of separate factors. Therefore, three additional models were tested across time points (table 15). These included testing a

higher-order PTSD factor in both the Simms (Model #3a) and King (Model #2a) models in which the four latent factors loaded onto a single latent factor, and a unidimensional model (Model #1) in which all twenty items loaded onto a single latent factor. Fit statistics across models at all time points indicated adequate to good fit with RMSEA estimates ranging from .083-.048, CFI estimates ranging from .892-.973, and TLI estimates ranging from .878-.969 (table 13). Component fit was excellent, with all items loading well above .30 onto latent factors. The data were modeled as categorical using the unweighted least squares estimator. Of note, this estimator does not provide AIC or BIC estimates, which are used to compare competing models. Since models were not otherwise distinguishable based on global and component fit, simplicity of the structure is often considered in determining which model to retain (Brown, 2015). Therefore, the most parsimonious model, the unidimensional model was retained. Therefore, my hypothesis that the Simms model would demonstrate the best fit was not supported.

Results of Specific Aim 2

Structural equation models (SEM) were tested to determine whether subjective and objective characteristics of childbirth mediated the relationship between history of trauma, fear of childbirth, and social support with PTSD measured in the postpartum period, while controlling for symptoms of PTSD during pregnancy (figure 4). Because the unidimensional model was retained, a composite PTSD score was used as the outcome in the SEM. Direct effects were significant between fear of childbirth and objective and subjective childbirth characteristics across time points.

Direct effects were observed between subjective birthing experiences and postpartum PTSD at 4 weeks postpartum (figure 3). Fear of childbirth had a direct effect on objective childbirth events and subjective perceptions of childbirth. A significant indirect effect was observed wherein subjective birthing experiences mediated the relationship between fear of childbirth and postpartum PTSD (unstandardized indirect effect=.022, $p<.05$). When focusing on PTSD at 8 weeks postpartum, the direct effect of subjective perceptions on PTSD was no longer significant; however, the direct effect of *objective* birthing

characteristics on PTSD was significant (figure 4). Objective birthing experiences were directly related to PTSD at 8 weeks and they also mediated the relationship between fear of childbirth and postpartum PTSD (unstandardized indirect effect=.009, $p<.05$; figure 4). There was also a direct effect of fear of childbirth and PTSD at 8 weeks postpartum suggesting additional mechanisms through which fear of childbirth impacts PTSD at 8 weeks. Notably, these significant pathways were observed even while controlling for PTSD symptoms during pregnancy.

Finally, when focusing on PTSD at 12 weeks postpartum, all direct and indirect effects became non-significant ($ps > .05$) suggesting time-limited effects of labor and delivery experiences on PTSD. My hypothesis that subjective and objective birthing experiences mediated the relationship between prenatal factors and postpartum PTSD were generally supported (with different pathways emerging when focusing on PTSD at different points in time). Further, my hypothesis that pathways would weaken as time progressed after childbirth was also supported. Indeed, the tested pathways no longer predicted PTSD at 12 weeks postpartum.

Results of Specific Aim 2.1

Structural equation models were also tested with relevant covariates of postpartum PTSD. High correlations between PTSD and depression in the postpartum period were observed, with Pearson correlation coefficients all greater than .70 (table 16). Therefore, though depression is a reasonable covariate of PTSD in the current study, it was not appropriate to include depression in the model with PTSD due to multicollinearity. Accordingly, OCD was included as the only covariate. When OCD was included as a covariate of postpartum PTSD, all effects remained significant at 4 weeks postpartum. However, at 8 weeks postpartum, the direct effect between fear of childbirth and PTSD remained significant, but the indirect effect was nonsignificant such that objective childbirth characteristics no longer mediated the association between fear of childbirth and PTSD.

Because depression could not be included as a covariate due to multicollinearity with PTSD, the models were also tested with depression as an *outcome*. When examining depression at 4 weeks postpartum, fear of childbirth was a significant predictor of objective and subjective birth experiences; however, no indirect or direct effects were observed between psychosocial variables and depression. However, as observed in the model with PTSD as the outcome, objective characteristics of birth mediated the relationship between fear of childbirth and depression at 8 weeks postpartum. The direct effect between fear of childbirth and depression was not significant.

Results of Specific Aim 3

Participants completed three structured clinical interviews, at pregnancy, 4, and 12 weeks postpartum that assessed for current and past episodes of depression, mania, PTSD and OCD (table 17).

During pregnancy, 275 women completed clinical interviews that assessed current and past diagnoses of PTSD. Twenty-six women met criteria for a past episode of PTSD. Women identified a variety of traumatic events that caused PTSD episodes. These included physical/sexual assault (n=19), learning of trauma (n=4), accident (n=2), and abortion (n=1). Out of the women who met criteria for a past episode of PTSD, one woman also met criteria for current PTSD during pregnancy, which was due to a sexual assault. At 4 weeks postpartum, out of 242 women, two women met criteria for new episodes of PTSD. Identified traumas were a past physical/sexual assault and learning of a trauma. Finally, at 12 weeks postpartum, 220 women completed clinical interviews. Between the four and 12 week postpartum interviews, two women met criteria for an episode of PTSD. One woman identified the death of her mother as the index trauma and she also met criteria for current PTSD at the time of the final interview. The other participant identified childbirth, more specifically an emergency cesarean section, as the cause of PTSD. One other participant met criteria for PTSD at the time of the final interview, due to her son being diagnosed with a severe chromosomal disorder.

Frequencies were also calculated using data exclusively from the PCL. Both a cutoff score of 33 was used to calculate the frequency of PTSD at each time point, as well as identifying women who endorsed “moderately” or greater for the required number of symptoms from each of the four criteria. When using a cutoff score of 33, 13 women met criteria for PTSD at baseline, three at 4 weeks postpartum, two at 8 weeks postpartum and one at 12 weeks postpartum. When counting criteria using the PCL, 15 women met criteria for PTSD at baseline, three at 4 weeks postpartum, five at 8 weeks postpartum and two at 12 weeks postpartum.

Though just one woman met criteria for PTSD due to childbirth (based on clinical assessment), many more women identified childbirth as a traumatic event that met the requirements for criterion A. At baseline three women identified a previous childbirth as traumatic and endorsed clinically significant symptoms of PTSD that met subthreshold criteria for the disorder. At 4 weeks postpartum, 17 women described the current childbirth as meeting the requirements for criterion A and two of these women reported clinically significant symptoms of PTSD that met subthreshold criteria for the disorder. One of these participants met full criteria for PTSD at 12 weeks postpartum, as reported above.

Results of Exploratory Analyses

Correlations were explored between maternal enjoyment/role attainment of breastfeeding and all other study variables (Table 18). At 4 weeks postpartum, maternal enjoyment was negatively correlated with depression, subjective birthing experiences, and fear of childbirth. At 12 weeks postpartum, maternal enjoyment was only associated with depression, and maternal enjoyment measured at 4 weeks postpartum.

CHAPTER FOUR: DISCUSSION

The present study examined the structure and risk of PTSD in perinatal women from pregnancy through 12 weeks postpartum. This study was the first to examine the structure of PTSD in pregnant and postpartum women, and results from specific aim 1 showed support for a one-factor model, emphasizing the need to account for the common PTSD factor in perinatal women. The longitudinal nature of the study allowed for an accurate clinical assessment of postpartum PTSD and the associated trauma, as well as risk factors related to PTSD symptoms at discrete time points. Specific Aims 2 and 2.1 provided evidence for the importance of both prenatal risk factors, namely fear of childbirth, as well as childbirth specific variables, including both subjective perceptions and objective characteristics, in predicting postpartum PTSD. Finally, results from Specific Aim 3 illustrated that while a significant number of women identify childbirth as a stressful and traumatic event, very few go on to meet criteria for PTSD due to childbirth experiences. These findings have important implications for both future research and clinical practice and will be further explored below.

Structure of Perinatal PTSD

The structure and presentation of PTSD have long been examined in various populations (Grant, Beck, Marques, Palyo, & Clapp, 2008; Gentes et al., 2015; Palmieri & Fitzgerald, 2005; Palmieri, Weathers, Difede, & King, 2007), and findings have aided in understanding how to organize symptoms and diagnose the disorder. Although two competing, though similar models (King et al., 1998; Simms et al., 2002), suggest a relatively complex structure of PTSD across a variety of populations (Palmieri et al., 2007, Golden-Kreutz, & Andersen, 2005; Shevlin, McBride, Armour, & Adamson, 2009), results from the current study suggest a more parsimonious one-factor model (with all items loading to one general factor) may be the best representation of the structure of PTSD in perinatal women. Indeed, although the original Simms and King models showed adequate global fit in the present sample, thorough examination of the component fit revealed high correlations ($> .70$) between most factors, which indicated poor

discriminant validity and suggested the presence of a higher-order shared dimension of PTSD symptoms. Hierarchical models were also tested to capture both the shared dimension, common to all PTSD symptoms, and the unique dimensions of PTSD as proposed by Simms and King. These hierarchical models also demonstrated adequate fit regardless of whether the Simms or King subfactors were modeled.

Taken together, the results of Aim 1 suggest that there is a higher-order shared dimension of PTSD that should be routinely accounted for when examining PTSD in perinatal women (and perhaps other populations). Depending on the particular aim of a study, researchers might choose to adopt a hierarchical structure that directly models common versus unique variance in PTSD symptoms or simply adopt a more parsimonious unidimensional model. If researchers adopt the more complex approach of modeling a higher-order shared factor and unique subfactors (i.e., a hierarchical structure), there does not appear to be a clear advantage to applying the Simms approach for defining the subfactors relative to the King approach in perinatal populations. Nonetheless, future examinations may reveal greater utility of one structure of subfactors relative to the other with regard to differential prediction of outcomes (e.g., treatment response, functional impairment).

It is noteworthy that a unidimensional model of PTSD is rarely observed in the literature; however, high correlations among PTSD factors are not unique to the perinatal population. In a recent meta-analytic investigation of the correlations between PTSD factors and external variables, Gootzeit and Markon (2011) found that PTSD factors were highly associated with one another with correlation coefficients ranging from .625-.800 across both the Simms and King models. When testing the original Simms and King models in the current sample, correlations among factors were consistent with and sometimes higher than those reported in Gootzeit and Markon. Researchers often defend the need for specific PTSD factors, regardless of the large associations between them, due to additional findings that individual factors have differing predictive power and associations with external variables such as depression, panic, trauma history, and generalized anxiety disorder (Gootzeit & Markon, 2011). In the current sample, there was support for the hierarchical model indicating that the four specific factors are

apparent in perinatal samples, though perhaps more highly related to one another than has been found in other populations.

There is utility in discussing the implications of the general factor, modeled both in the unidimensional and hierarchical models. Watson (2009) notes that PTSD symptoms are characterized by a “strong general factor,” an assertion supported by the high intercorrelations among the factors. In the current sample, these correlations were somewhat higher than what has been previously found, possibly indicating that this general factor is even more pronounced in a perinatal sample. PTSD in a perinatal sample might look more like general negative affect than PTSD, specifically. The general factor is often cited as representing negative affect or general dysphoria within each of the PTSD factors. The high correlations between PTSD and depression at each time point in the current study support this possibility, as correlations greater than .70 indicate a major overlap of symptoms and general redundancy between the two disorders.

It is worth noting that this is the only study to examine the structure of PTSD in a sample of community, postpartum women, and therefore the results are novel and may be difficult to relate to existing findings. This sample is unique from the many other types of populations in which the structure of PTSD has been examined for several reasons. First, most studies that have examined the structure of PTSD have done so in varying types of clinical samples. Either the sample has been exposed to a “traditional” form of trauma, such as domestic violence, warfare, or motor vehicle accidents, or sample subjects meet criteria for specific psychiatric disorders. The current sample is neither clinical, nor were they targeted for experiencing a specific type of trauma. This sample is related in that all women were pregnant, and subsequently gave birth; however, childbirth is a much more complex form of possible trauma than a majority of the other forms of trauma in which PTSD is measured. While childbirth is undoubtedly traumatic for some women (Boorman, Devilly, Gamble, Creedy, & Fenwick, 2014), others find the experience invigorating and, regardless of the specific childbirth experience, find joy in having a child after the fact. This is unlike any other event that has been considered as a possible trauma in

causing symptoms of PTSD. Thus, it seems likely that these results may be different from what has been demonstrated in the existing literature.

There have been a few studies that have compared the structure of PTSD between clinical, trauma-exposed samples and community, non-trauma exposed samples (Biehn, Elhai, Fine, Seligman, & Richardson, 2011; Elhai et al., 2009). Similar to the current findings, these studies show very little difference between global fit of the King and Simms models. However, deeper exploration into other possible models, such as unidimensional or hierarchical models that model shared variance among symptoms, were not always conducted. This is an oversight in the literature, especially given numerous studies have demonstrated high correlations among PTSD factors. Though some studies have tested one-factor models and found them to be poorly fitting (Elkit & Shevlin, 2007; Schinka, Brown, Borenstein, & Mortimer, 2007; Simms et al., 2002), it is important to at least consider this as a baseline model and examine whether there is evidence to support a more complex factor structure. PTSD is one of the more complex disorders in the DSM, as it requires a specific number of symptoms from each of the four criterion domains. In the DSM-5 (APA, 2013), these criteria are based on research findings that support the four-factor structure of PTSD (King, 1998). Therefore, support for a one-factor model possibly indicates that the need for individuals to meet criteria for each of the four individual factors may not be empirically supported. The one-factor model suggests that the four factors are not necessarily distinct from one another, at least not in perinatal women, and that perinatal PTSD may present as an amalgam of symptoms, not necessarily from each of the four factors.

Future research warrants looking more closely at how perinatal women are endorsing specific PTSD symptoms. This will help to clarify whether all symptoms are valid indicators of PTSD in pregnant and postpartum women. For example, in the current study, one item (*“taking too many risks or doing things that could cause you harm”*) was eliminated from CFA analyses at 4 and 12 weeks postpartum because virtually all women endorsed “not at all.” This particular item was added to align with the DSM-5 (American Psychiatric Association, 2013) and problems with this item have been noted

in several other studies that have evaluated the DSM-5 symptom structure of PTSD and found it did not fit well within the model (Gentes, Dennis, Kimbrel, Rissling, & Beckham, 2014; Miller et al., 2013). However, it is possible that this item is simply not informative when examining PTSD in a perinatal sample because new mothers may be less inclined to engage in risky behaviors.

In a similar vein, several symptoms associated with PTSD, including trouble sleeping, irritability, loss of interest, and difficulty concentrating, are often expected and normal symptoms during pregnancy and the postpartum. These similarities make it difficult to disentangle normal pregnancy symptoms from psychopathology. There has been one study that has started to investigate this issue in regards to the hyperarousal factor (Ayers, Wright, & Ford, 2015). Researchers investigated the distribution of hyperarousal items among postpartum women and compared these statistics among women who endorsed childbirth as being traumatic versus those who did not. Findings indicated that several hyperarousal items were endorsed by both traumatized and nontraumatized women. Using receiver operating characteristic curve analyses, Ayers et al. showed that hyperarousal items performed poorly at identifying women who experienced traumatic birth. On the other hand, re-experiencing and avoidance items were much more informative in identifying women who experienced traumatic birth.

Similar issues have been noted when assessing depression during the perinatal period. Symptoms of depression such as irritability, fatigue, sleep and appetite changes are also normal experiences for many women during the perinatal period. A recent study used CFA multiple group analyses to evaluate which indicators are most informative and associated with depression when assessing this disorder in postpartum women (Williamson et al., 2015). Researchers showed that while these symptoms were associated with depression in postpartum women, when controlling for depression, postpartum women endorsed higher levels of irritability, insomnia and appetite change. Researchers concluded that it was important to account for higher baseline levels of these symptoms in postpartum women when assessing for postpartum depression. Similarly, it may be the case that specific items that are used to measure PTSD in the broader population are not indicative of or helpful in assessing PTSD in a perinatal population.

Investigation into this issue may alter the way that we measure these symptoms in perinatal women, and change how we look at symptom structure and presentation of the disorder in this type of sample.

Finally, it may be useful to test the structure of PTSD in a targeted or at-risk sample. A vast majority of the existing literature that measures the structure of PTSD does so in clinical populations that either have experienced a trauma, meeting requirements for criterion A or have a clinical diagnosis of PTSD. It is possible that the structure differs in this sample, simply because it is a community, rather than clinical sample. A sample that is targeted for increased risk of postpartum PTSD may align better with a non-perinatal clinical sample in terms of the structure of PTSD.

Risk of Postpartum PTSD

Fear of childbirth and subjective and objective birthing characteristics were all shown to be important factors in predicting postpartum PTSD symptoms to a varying degree at different time points. These results both replicated and expanded upon the results of recent study that modeled the relationship between fear of childbirth, pregnancy psychopathology (depression, anxiety, and PTSD) and subjective and objective birthing experiences with PTSD at 8 weeks postpartum (Garthus-Neigel et al., 2013). Garthus-Neigel et al. found that objective and subjective birthing characteristics mediated the relationship between pregnancy psychopathology along with fear of childbirth and PTSD in the postpartum period. The current study replicated the mediating role of objective and subjective birthing experiences between fear of childbirth and postpartum PTSD, and expanded on these results by evaluating these effects at differing time points. These results indicated that subjective characteristics fully mediated the relationship between fear of childbirth and postpartum PTSD at 4 weeks postpartum, while objective characteristics partially mediated the relationship at 8 weeks postpartum. Importantly, these results were significant while controlling for PTSD symptoms during pregnancy. Specifying the timing of *when* predisposing and childbirth-related factors show significant influence on postpartum PTSD symptoms

allows for a more detailed understanding of the longitudinal course of risk of postpartum PTSD symptoms.

The current study also expanded upon prior research by evaluating sociodemographic risk factors (history of trauma, social support) rather than pregnancy psychopathology; however, these factors did not show significant direct or indirect relationships with postpartum PTSD. Although low social support and having experienced a history of trauma are traditionally associated with and predictive of postpartum psychopathology (O'Hara & McCabe, 2013; Sexton, Hamilton, McGinnis, Rosenblum, & Muzik, 2015) and PTSD specifically (Ayers, Bond, Bertullies, & Wijma, 2016; Grekin & O'Hara, 2014; Lev-Wiesel, Chen, Daphna-Tekoah, & Hod, 2009), results of the present study contradict past findings and, instead, emphasize the importance of childbirth specific characteristics (i.e., fear of childbirth, subjective perceptions, objective traits) in predicting postpartum PTSD. It is possible that specific types of past traumatic exposures are associated with postpartum PTSD, while a general history of trauma is not. Some studies have found robust relationships between interpersonal trauma, specifically, and postpartum PTSD, while other traumatic events are not as robustly associated (Wosu, Gelaye, & Williams, 2015). Additionally, existing research finds that levels of social support during pregnancy are not always related to postpartum PTSD, however, support *during* childbirth and in the immediate postpartum period tend to be more consistently related to these symptoms (Iles, Slade, & Spiby, 2011).

Fear of Childbirth

Fear of childbirth has repeatedly been shown to be a driving predictor of postpartum PTSD symptoms (Ayers et al., 2016). The relationship between these variables is not surprising, though it emphasizes the unique nature of childbirth as a trauma. Traditional forms of trauma are unexpected and consequences of traumatic exposure often result in avoidance and phobia of triggers and experiences that mirror the traumatic event. Though often maladaptive and a maintaining factor of PTSD and anxiety symptoms, people are generally able to avoid experiences of which they are phobic and afraid. Therefore,

one might imagine the impact of anticipating a traumatic event for many months of which one has a clinical phobia. Pregnant women recognize that they will have to go through childbirth; it cannot be avoided. A form of avoidance is apparent in the request for elective cesarean sections; many studies have shown that women with severe fear of childbirth are more likely to request elective cesarean sections (Nerum, Halvorsen, Sorlie, & Oian, 2006; Nieminen, Stephansson, & Ryding, 2009; Rouhe et al., 2012).

The current study showed a predictive relationship between fear of childbirth and both subjective childbirth experiences *and* objective characteristics. It is understandable that women with a fear of childbirth will show increased negative appraisals of birthing experiences and this has been supported in existing studies (Nilsson, Bondas, & Lundgren, 2010; Zar, Wijma, & Wijma, 2001). The importance of this variable, though, is further emphasized by the finding that fear of childbirth predicted objective characteristics of childbirth. These characteristics include undesirable maternal and infant outcomes and procedures, like low birth-weight, premature birth, emergency cesarean sections, and NICU hospitalization. It is possible that the increased stress and anxiety that may be associated with fear of childbirth, and anticipating a negative birthing experience may put women and their infants at risk for these adverse outcomes (Ding et al., 2014). However, it is important to note that the current study does not consider important confounding variables that may also be associated with both fear of childbirth and perinatal complications. For example, women who may be at increased risk during pregnancy for complications will likely visit their providers more often and be reminded of this increased risk. This increased risk of complications will clearly predict childbirth complications and may also predict fear of childbirth.

Subjective Perceptions and Objective Characteristics

It has been emphasized that postpartum PTSD, particularly PTSD related to childbirth trauma, is unique and distinct from PTSD in the broader population. However, findings regarding subjective experiences and objective characteristics of childbirth as predictors of PTSD symptoms are reflective of

findings in studies of risk factors associated with PTSD across populations. Subjective perceptions of a traumatic event are often cited as important predictive and impactful factors on the development of PTSD (Ehlers & Clark, 2000; Ozer et al., 2003). Across samples experiencing traumas such as motor vehicle accidents (Ehring, Ehlers, & Glucksman, 2008), sexual assault (Ullman, Filipas, Townsend, & Starzynski, 2007), and natural disasters (Brock et al., 2015), perceptions of lack of control, threats of injury/death and overall distress to the event, have been shown to be strongly predictive of post-trauma psychopathology.

Similarly, in the current study, subjective perceptions of childbirth were predictive of PTSD symptoms at 4 weeks postpartum. Subjective experiences during childbirth assessed for in this study accounted for support by medical staff and feelings of control, pain and distress, and fear for self and baby. In the case of childbirth-related PTSD, it is exceedingly helpful to understand what specific perceptions of the childbirth experience are impactful on outcomes, because they point to possible areas of intervention. Unlike traditional traumas causing PTSD, childbirth is not unexpected and therefore certain factors, like behaviors of medical staff or patients, can be intervened upon *before* or even during the event. It may be possible to provide interventions to women during pregnancy that help to empower them during the childbirth experience, prevent feelings of loss of control, and encourage obtaining helpful support during delivery.

Though related, objective characteristics and subjective perceptions are distinct factors, and this makes it important to examine the effects of both on the aftermath of trauma. As described above, findings have supported the relationship between subjective perceptions of childbirth (and other traumas) and PTSD. Some research has also pointed to the importance of specific objective factors in predicting PTSD. For example, in a study of soldiers who had experienced specific combat events, those soldiers who had been injured had a greater likelihood of developing PTSD and endorsed higher levels of PTSD symptoms as well as other psychopathology like depression (Koren, Norman, Cohen, Berman, & Klein, 2005). Studies regarding postpartum PTSD have obtained similar findings, wherein women who experience childbirth interventions or have infants with poor outcomes are at higher risk for developing

PTSD in the postpartum period (Ayers, Bond, Bertullies, & Wijma, 2016; Grekin & O'Hara, 2014). The current study supported this notion, because objective factors were predictive of PTSD at 8 weeks postpartum. It is key to note that the present study used a comprehensive measure of objective characteristics of childbirth, coded from medical records by an Obstetrician-Gynecologist. The Peripartum Events Scale covers a wide variety of perinatal risk, including adverse outcomes for the mother and her infant. Although previous studies have found that specific birth interventions like emergency cesarean sections, assisted vaginal deliveries, and poor infant outcomes were individually predictive of postpartum PTSD, this is the only study to use such a wide reaching measure of obstetric risk. Additionally, as subjective perceptions and objective characteristics were predictive of PTSD at differing time points, this further emphasizes the distinct nature of the two variables and underscores the importance of examining both variables when investigating perinatal PTSD.

Timing and Specificity of Symptoms and Risk Factors

It was hypothesized that significant pathways tested in the proposed SEM would change across time points; specifically, that objective characteristics and subjective perceptions would mediate the relationship between prenatal risk factors and postpartum PTSD at 4 weeks postpartum, but that these effects would lessen and possibly become nonsignificant by 12 weeks postpartum. These hypotheses were partially realized across time points. At 4 weeks postpartum, subjective, but not objective characteristics mediated the relationship between fear of childbirth and postpartum PTSD; at 8 weeks postpartum, objective, but not subjective characteristics, mediated the relationship between fear of childbirth and postpartum PTSD, and there was a direct relationship between fear of childbirth and postpartum PTSD; finally at 12 weeks postpartum, all effects became nonsignificant.

It is important to consider what these results might imply for specific risk factors' impacts across the postpartum period. Firstly, fear of childbirth is a robust predictor of PTSD up until 12 weeks postpartum, but how it is related to PTSD varies across time. If using childbirth as the indicated trauma,

PTSD symptoms between 0 and 8 weeks postpartum represent an acute stress reaction, that is, PTSD symptoms that occur less than 4 weeks after the trauma and last for less than 4 weeks. It is possible that in a community postpartum sample, the psychological effects of subjective perceptions of childbirth, though impactful as they fully mediate the relationship between fear of childbirth and PTSD are temporary and only predictive of symptoms within the first several weeks following childbirth. Women in this sample were mostly healthy, had adequate support and had healthy, normally developing infants. After the initial shock of childbirth diminishes, the subjective perceptions they had of their delivery become less impactful as well.

Though temporary, these risk factors are robustly predictive of PTSD symptoms, *specifically*. When OCD was entered into the model as a covariate of PTSD symptoms at 4 weeks postpartum, all indirect and direct paths remained significant. Additionally, although depression was highly correlated with PTSD symptoms and therefore could not be entered as a covariate, the same pathways that were significant when predicting PTSD symptoms were no longer significant when using depression as the outcome variable. Therefore, though concerns have been raised regarding the high correlations between postpartum depression and postpartum PTSD (Grekin & O'Hara, 2014), the specificity of this model indicates that PTSD symptoms as measured in this sample are distinct from other postpartum psychopathology, including depression and OCD. Fear of childbirth and subjective experiences during labor are two variables that are distinctly and specifically related to postpartum PTSD.

At 8 weeks postpartum, women who had objectively high-risk deliveries may observe lingering effects of adverse outcomes like emergency cesarean sections, assisted vaginal deliveries, preterm or low birth weight infants. These tangible outcomes, which women may have expected to have been resolved at this time, may cause added stress and perhaps even serve as reminders for what might have been a traumatic delivery experience. These lingering effects may help to explain why objective characteristics mediate the relationship between fear of childbirth and postpartum PTSD at 8 weeks postpartum.

Additionally, it is important to consider the specificity of these results. Unlike the results at 4 weeks

postpartum, once significant indirect effects between fear of childbirth and postpartum PTSD through objective birth characteristics, as well as paths between objective and subjective birth experiences and postpartum PTSD, become nonsignificant when OCD is entered as a covariate. Similarly, when depression is entered as the outcome variable, the same significant pathways showing indirect effects from fear of childbirth to depression through objective childbirth characteristics remain significant. These results imply that the 8 week model is predictive of general postpartum psychopathology, rather than PTSD specifically. These findings align with the existing literature that illustrates the predictive relationship between birth complications and other postpartum psychopathology including depression and OCD (Blom et al., 2010; Zambaldi et al., 2009).

At 8 weeks postpartum, there is also a direct relationship between prenatal fear of childbirth and postpartum PTSD, no longer mediated by subjective perceptions of childbirth. This direct effect remained significant when OCD was entered as a covariate, and became nonsignificant when depression, rather than PTSD, was entered as the outcome. These findings further emphasize the strong and specific relationship fear of childbirth has with postpartum PTSD symptoms.

Traumatic Delivery and Childbirth-Related PTSD

Most studies find that many more women identify delivery as traumatic than those who go on to meet criteria for childbirth related PTSD (Alcorn et al., 2010), and similar findings were evidenced in the current study. While 17 (about 7%) women described childbirth as traumatic and met the requirements for criterion A, just one woman went on to meet criteria for childbirth-related PTSD. This percentage is significantly lower than previous estimates of between 3-5% of samples (Grekin & O'Hara, 2014). However, until recently, many studies reported prevalence rates based on self-report measures and did not robustly assess childbirth as meeting requirements for criterion A, and this would likely inflate the estimated frequency. This is an important strength of the current study, as clinical interviews at several time points, both during pregnancy and postpartum, allowed for the researchers to identify episodes of

PTSD, the associated trauma, as well as timing of onset of the symptoms. Interestingly, in the current study, estimates of frequency of PTSD using the PCL cutoff score, and symptoms from each of the four criteria were almost equivalent to frequencies at each of the postpartum time points. During pregnancy, however, frequencies were inflated when using the PCL as opposed to estimates using clinical interviews.

Though this study shows a small percentage of the sample endorsing childbirth as traumatic and an even smaller proportion meeting subthreshold or threshold criteria for childbirth related PTSD, these findings are nonetheless important contributions to the existing literature. It is imperative to continue to acknowledge and affirm that childbirth, though qualitatively very different from traditional forms of trauma, is consistently perceived as traumatic by a significant number of women and can subsequently cause clinically significant PTSD symptoms in the postpartum period.

Limitations

The current study is not without limitations. First, the sample is demographically homogenous, and is therefore generalizable to mostly white, upper class, highly educated women. In a similar vein, this sample had low levels of psychiatric symptoms, even somewhat lower than average community samples. Future studies would benefit from examining larger and more diverse samples according to these characteristics.

Second, while one of the major strengths of the study was the prospective longitudinal study procedures, one variable, subjective birthing experiences, was measured retrospectively, at 4 weeks postpartum. This means that this variable was measured at the same time as PTSD, OCD, and depression, as well as other variables measured at this time point. It is possible that subjective perceptions of an event are sensitive to the amount of time that has elapsed since the event, and therefore findings could have differed from the current study if these perceptions were measured closer to childbirth. Going forward, research might examine if and how subjective perceptions of childbirth might change across time early in

the postpartum period. Additionally, it would be informative if researchers could measure subjective perceptions *during* childbirth, rather than after.

Finally, one may argue that subjective perceptions and PTSD are highly similar and overlap with one another. Subjective perceptions are closely related to criterion A, and criterion A is one of the criteria of PTSD. Therefore, it may be expected that these two constructs are related to one another and not theoretically informative when examining PTSD. However, when considering postpartum PTSD in a clinical context, it is important to understand why and how women subjectively perceive childbirth as traumatic.

Clinical Implications

The current findings support clinical implications regarding both prevention and screening of postpartum PTSD. Both fear of childbirth and subjective perceptions of childbirth were predictive of PTSD symptoms in the postpartum period, and these are both modifiable variables. Midwives, obstetricians, nurses and other healthcare workers may easily assess for fear of childbirth during prenatal visits, whether formally or informally. It may not be necessary to formally intervene with women for fear of childbirth, but instead to ask about their expectations, and transparently answer any questions they may have, while emphasizing that events during childbirth are often unexpected, and some are uncontrollable. Women may feel reassured and less fearful if they are more knowledgeable about the birthing process. In the same vein, birth plans have become widespread and popular among women in preparing for childbirth (Lothian, 2006). In general, they are intended to empower women during childbirth and decrease fear and uncertainty about childbirth experiences. While these may be helpful in terms of temporarily allowing women to feel in control of birthing experiences, birth plans that are rigid and include possibly unreasonable expectations (i.e. refusal of intervention, epidurals, etc.) may lead to increased stress and negative appraisals of childbirth when these interventions are warranted and necessary, and thus do not meet expectations. Indeed, some research on postpartum PTSD has shown that when there is a significant

difference between expectations of childbirth and the actual events, women are more likely to experience birth as traumatic (Beck, 2004).

It is possible though that a *flexible* birth plan could be used in the case of a woman with low levels of fear of childbirth to simply clarify the likely progression of childbirth, as well as the unexpected events that may occur (Hollins Martin, 2008). This could serve to keep lines of communication open between patient and health care provider both prenatally and during labor and delivery. This type of intervention could indirectly lessen the likelihood of a woman perceiving her childbirth negatively because she feels more informed, in control, and supported by health care workers and others attending the birth. Although many objective characteristics of childbirth as measured in the current study may not be directly modifiable, the current study showed a relationship between fear of childbirth and these objective traits, and therefore an intervention for fear of childbirth may also lessen obstetric intervention and specific adverse outcomes.

For women who present with more severe forms of fear of childbirth, more formal interventions may be warranted. Several studies have reported on a variety of interventions targeted at lessening requests for cesarean section, which consistently have been shown to be strongly associated with fear of childbirth (Nerum et al., 2006; Rouhe et al., 2012 ;Saisto, Salmela-Aro, Nurmi, Kononen, & Halmesmaki, 2001). A majority of these interventions combine both educational components regarding childbirth, as well as cognitive-behavioral strategies to change thoughts and expose women to the hospital and maternity ward where they are planning to deliver. In moving forward with successful interventions, it would be helpful to determine what types of health care workers (midwives vs. social workers), the intensity of said interventions (formalized vs. casually occurring during prenatal appointments), and the components that are needed to create an impactful and reasonably administered intervention.

Screening is also particularly important for postpartum women, and healthcare workers have unique opportunities in the immediate postpartum period, while women are still in the hospital, to screen women for possible symptoms. Existing literature on screening for postpartum mental health issues is

extensive surrounding postpartum depression. In general, mental health screening is complex, as it requires the need for screening methods that are concise, yet accurate, and cost efficient. Additionally, it is imperative to have resources for referrals if someone screens positive. The Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, Sagovsky, 1987) is one of the most widely used screeners of postpartum depression (Boyd, Le, & Somberg, 2005) and provides a brief though accurate measure of depressive symptoms in the postpartum period. It is standard practice for many hospitals to use the EPDS or other depression screens in the immediate postpartum period, shortly after a woman has delivered as well as at the six-week postpartum check-up. The prevalence of postpartum PTSD is much lower than postpartum depression and one might argue that the burden in terms of cost and time on both patients and healthcare workers may outweigh the benefits that screening for these symptoms may provide. However, as has been repeatedly shown in this study and others, postpartum depression and PTSD, though distinct are highly related to one another (Ayers et al., 2016; Grekin & O'Hara, 2014), therefore it could be useful to identify women at risk for postpartum PTSD based both on scores on depression assessments, as well as perhaps one question that identified overall distress in reaction to the childbirth experience. For example, *“Was your childbirth experience as expected?”*, or *“Did you consider your childbirth experience to be very stressful or traumatic?”*. These questions may efficiently address a woman's subjective perceptions of her delivery.

Conclusions and Future Directions

The current study aimed to address several of the gaps existing in the literature regarding postpartum PTSD. This is the first study to evaluate the structure of postpartum PTSD. Results indicated that a one-factor model, with all indicators loading onto a PTSD latent factor, was preferable to other models, as it reflected adequate fit and was the most parsimonious. High correlations among the four-factor models tested indicate that these factors are more highly related to one another and overlapping than what is found in other types of populations. These findings emphasize the importance of

acknowledging this higher-order, shared dimension of PTSD, particularly in perinatal samples. Moving forward, it would be beneficial to look more deeply at the individual items and identify differences among item endorsement between perinatal and non-perinatal women. Additionally, the structure should also be examined in an at-risk or targeted sample of perinatal women.

The current study adds to the growing literature that supports the impact of fear of childbirth as well as subjective and objective characteristics of birth on the development of postpartum PTSD symptoms. These variables present important characteristics to intervene upon. Future research on interventions to prevent postpartum PTSD should be focused both on lessening fear of childbirth, helping women to become informed and flexible regarding their childbirth experiences, and possibly even training healthcare workers present during childbirth to be mindful of specific factors that might contribute to negative appraisals of childbirth.

Finally, the lack of studies that robustly assess for PTSD from pregnancy to the postpartum period, and determine the trauma associated with postpartum PTSD episodes, have cast doubt on the possibility that childbirth could be perceived as traumatic and subsequently cause clinically significant PTSD symptoms. Although this study used a community sample of generally healthy women, many endorsed childbirth as traumatic and several identified clinically significant levels of PTSD symptoms due to their childbirth experience. The findings of this study emphasize the need for acknowledgement of postpartum PTSD as a legitimate disorder faced by a vulnerable population of postpartum women. It sets the foundation of longitudinal research regarding trauma and PTSD in perinatal women and warrants further investigation on the impact of postpartum PTSD on women and their families further into the postpartum period.

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TABLES

Table 1. Time points and study assessments

Time Point	Measures
Third Trimester (28 weeks plus)	Demographics TLEQ PCL OCI-R IDAS W-DEQ(A) MOS-SS SCID-Depression, PTSD, OCD and Mania modules
4 weeks postpartum	PCL OCI-R IDAS PLDS TES-B PES SCID-Depression, PTSD, OCD and Mania modules
8 weeks postpartum	PCL OCI-R IDAS
12 weeks postpartum	PCL OCI-R IDAS SCID-Depression, PTSD, OCD and Mania modules

Notes. PCL: Posttraumatic Stress Disorder Checklist; OCI-R: Obsessive Compulsive Inventory-Revised; IDAS: Inventory of Depression and Anxiety Symptoms; W-DEQ(A): Wijma-Delivery Experiences Questionnaire (version A); MOS-SS: Medical Outcomes Study-Social Support; SCID: Structured Clinical Interview of DSM-IV Diagnoses; TES-B: Traumatic Events Survey-Version B; PES- Peripartum Events Scale

Table 2. Participant demographics

Variable	Mean(SD)
Age	32.5 (4.8)
	Frequency (%)
Race	
Native American	2 (.8)
Asian	8 (3.0)
Black	5 (1.9)
White	247 (92.9)
More than one race	4 (1.5)
Ethnicity	
Latino	13 (4.9)
Not Latino	254 (95.1)
Education Level	
Less than Bachelor's	86 (32.0)
Bachelor's or Masters	145 (53.9)
Doctoral/Professional Degree	38 (14.1)
Income Level	
<30,000	47 (17.5)
30-70,000	105 (39.0)
>70,000	117 (43.5)
Marital Status	
Single	30 (11.1)
Married/Co-Habiting	238 (88.1)
Separated/Divorced	2 (.7)

Table 3. Descriptives of psychopathology

	Mean (SD)
Pregnancy	
PTSD Symptoms	8.76 (10.632)
OCD Symptoms	6.07 (7.443)
Depressive Symptoms	35.79 (10.046)
Four Weeks Postpartum	
PTSD Symptoms	5.37 (7.368)
OCD Symptoms	4.56 (6.041)
Depressive Symptoms	34.94 (9.770)
Eight Weeks Postpartum	
PTSD Symptoms	4.31 (6.953)
OCD Symptoms	4.35 (6.064)
Depressive Symptoms	32.34 (8.799)
Twelve Weeks Postpartum	
PTSD Symptoms	4.24 (6.292)
OCD Symptoms	4.37 (6.391)
Depressive Symptoms	31.55 (8.168)

Note. Pregnancy: N=268-271; Four Weeks N=231-233; Eight Weeks: N=220; Twelve Weeks: N=214.

Table 4. Descriptives of psychosocial variables

Variable	Mean(SD)
Subjective Perceptions	61.61 (20.116)
Objective Characteristics	8.43 (3.954)
Social Support	79.55 (14.878)
Trauma	2.71(2.202)
FOC	50.44 (19.192)

Note. FOC=Fear of Childbirth; Trauma: Number of endorsed lifetime traumas.

Table 5. Item correlations between PCL items during pregnancy

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. PCL_1	--																		
2. PCL_2	.568	--																	
3. PCL_3	.554	.521	--																
4. PCL_4	.688	.444	.527	--															
5. PCL_5	.583	.492	.549	.725	--														
6. PCL_6	.583	.450	.502	.614	.533	--													
7. PCL_7	.532	.359	.502	.508	.544	.681	--												
8. PCL_8	.295	.310	.138	.280	.221	.363	.226	--											
9. PCL_9	.577	.467	.445	.540	.520	.506	.464	.325	--										
10. PCL_1	.609	.425	.546	.572	.523	.510	.557	.248	.574	--									
11. PCL_1	.649	.496	.515	.594	.541	.517	.480	.285	.608	.607	--								
12. PCL_1	.469	.359	.476	.497	.505	.337	.357	.194	.570	.462	.551	--							
13. PCL_1	.484	.375	.526	.489	.455	.393	.401	.180	.645	.482	.531	.694	--						
14. PCL_1	.480	.320	.400	.485	.430	.417	.364	.181	.601	.442	.537	.655	.706	--					
15. PCL_1	.405	.334	.317	.466	.427	.325	.306	.058	.533	.344	.444	.569	.625	.532	--				
16. PCL_1	.338	.330	.458	.194	.308	.222	.321	.193	.396	.351	.359	.434	.411	.394	.193	--			
17. PCL_1	.555	.470	.352	.476	.441	.503	.424	.296	.517	.360	.479	.359	.335	.335	.403	.128	--		
18. PCL_1	.474	.465	.349	.432	.417	.448	.300	.394	.473	.283	.476	.355	.385	.364	.367	.214	.662	--	
19. PCL_1	.530	.450	.463	.416	.389	.363	.341	.149	.517	.357	.523	.509	.662	.568	.531	.211	.453	.465	--
20. PCL_2	.422	.459	.290	.298	.279	.245	.302	.058	.387	.343	.414	.357	.470	.412	.393	.271	.286	.307	.537

Note. Items bolded are significant at $p < .05$. $N=263-268$.

Table 6. Skewness and kurtosis of PCL items during pregnancy

	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
PCL_1	1.660	.149	2.822	.297
PCL_2	2.472	.149	7.590	.297
PCL_3	3.006	.150	9.386	.298
PCL_4	1.241	.149	1.074	.297
PCL_5	2.383	.150	6.206	.298
PCL_6	1.322	.150	.871	.299
PCL_7	1.688	.149	2.001	.297
PCL_8	2.787	.150	8.695	.298
PCL_9	2.173	.149	4.854	.297
PCL_10	1.801	.149	2.912	.297
PCL_11	1.816	.149	3.104	.297
PCL_12	3.046	.149	10.480	.297
PCL_13	1.983	.149	4.003	.297
PCL_14	2.572	.149	6.569	.297
PCL_15	1.998	.149	4.091	.297
PCL_16	6.486	.149	48.502	.297
PCL_17	2.051	.149	4.044	.297
PCL_18	2.768	.149	8.059	.297
PCL_19	1.653	.149	2.161	.298
PCL_20	1.439	.149	1.482	.298

Table 7. Correlations between PCL items at 4 weeks postpartum

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. PCL_1	--																		
2. PCL_2	.527	--																	
3. PCL_3	.358	.278	--																
4. PCL_4	.628	.555	.391	--															
5. PCL_5	.480	.542	.325	.671	--														
6. PCL_6	.536	.472	.219	.656	.601	--													
7. PCL_7	.483	.458	.223	.547	.482	.810	--												
8. PCL_8	.276	.392	.240	.412	.472	.337	.343	--											
9. PCL_9	.401	.423	.213	.428	.522	.516	.404	.284	--										
10. PCL_10	.521	.490	.465	.597	.491	.495	.438	.294	.560	--									
11. PCL_11	.490	.413	.468	.557	.583	.488	.391	.267	.729	.662	--								
12. PCL_12	.267	.397	.181	.298	.328	.367	.255	.167	.567	.451	.477	--							
13. PCL_13	.265	.273	.257	.312	.346	.213	.148	.154	.441	.398	.470	.554	--						
14. PCL_14	.238	.255	.295	.386	.455	.310	.187	.281	.430	.358	.495	.469	.532	--					
15. PCL_15	.248	.305	.266	.304	.334	.306	.203	.145	.519	.471	.498	.514	.459	.450	--				
16. PCL_16	.088	.179	-.016	.174	.267	.159	.186	.440	.070	.170	.070	-.028	.208	.106	.048	--			
17. PCL_17	.324	.422	.470	.400	.434	.332	.330	.290	.367	.405	.474	.385	.355	.396	.410	-.036	--		
18. PCL_18	.246	.461	.336	.310	.386	.263	.219	.229	.342	.299	.336	.433	.351	.353	.347	-.025	.547	--	
19. PCL_19	.182	.307	.199	.251	.285	.184	.160	.192	.296	.245	.357	.517	.499	.439	.400	.137	.447	.347	--
20. PCL_20	.172	.209	.120	.254	.339	.154	.039	.123	.363	.183	.384	.406	.381	.367	.436	.049	.346	.314	.456

Note. Items bolded are significant at $p < .05$. $N = 231-233$.

Table 8. Skewness and kurtosis of PCL items at 8 weeks postpartum

	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
PCL_1	2.182	.159	4.494	.318
PCL_2	4.912	.159	30.057	.318
PCL_3	4.269	.159	19.188	.318
PCL_4	2.266	.159	6.243	.318
PCL_5	4.696	.159	26.974	.318
PCL_6	2.681	.159	7.542	.318
PCL_7	3.241	.159	11.712	.318
PCL_8	3.906	.159	16.802	.318
PCL_9	3.336	.160	13.096	.318
PCL_10	3.136	.160	10.927	.318
PCL_11	2.215	.159	6.188	.318
PCL_12	3.381	.159	14.643	.318
PCL_13	1.694	.159	2.790	.318
PCL_14	2.696	.159	9.145	.318
PCL_15	1.962	.160	4.124	.318
PCL_16	15.264	.159	233.000	.318
PCL_17	2.260	.160	6.331	.319
PCL_18	3.815	.159	21.852	.318
PCL_19	1.458	.160	1.421	.318
PCL_20	2.217	.160	5.630	.318

Table 9. Correlations between PCL items at 8 weeks postpartum

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. PCL_1	--																		
2. PCL_2	.431	--																	
3. PCL_3	.511	.266	--																
4. PCL_4	.528	.306	.509	--															
5. PCL_5	.430	.360	.410	.596	--														
6. PCL_6	.493	.496	.314	.590	.661	--													
7. PCL_7	.472	.274	.398	.465	.499	.567	--												
8. PCL_8	.214	.271	.217	.334	.220	.240	.350	--											
9. PCL_9	.457	.378	.471	.438	.554	.590	.521	.255	--										
10. PCL_10	.417	.368	.370	.574	.527	.598	.523	.228	.627	--									
11. PCL_11	.489	.401	.476	.591	.534	.547	.402	.173	.609	.589	--								
12. PCL_12	.306	.214	.334	.302	.429	.422	.296	.150	.532	.447	.472	--							
13. PCL_13	.375	.330	.381	.335	.433	.432	.254	.163	.530	.326	.527	.635	--						
14. PCL_14	.373	.375	.454	.449	.524	.518	.303	.133	.587	.387	.545	.708	.722	--					
15. PCL_15	.249	.330	.312	.348	.322	.328	.423	.255	.460	.344	.471	.399	.497	.493	--				
16. PCL_16	.162	.217	.242	.310	.422	.473	.313	.110	.427	.528	.388	.533	.323	.461	.314	--			
17. PCL_17	.376	.382	.508	.316	.396	.439	.351	.196	.506	.442	.461	.400	.422	.396	.383	.335	--		
18. PCL_18	.317	.359	.452	.370	.445	.532	.380	.282	.537	.497	.491	.434	.469	.448	.450	.427	.560	--	
19. PCL_19	.287	.272	.327	.402	.408	.433	.239	.210	.453	.353	.519	.498	.574	.613	.351	.303	.403	.509	--
20. PCL_20	.217	.336	.269	.317	.416	.332	.217	.113	.396	.317	.427	.542	.534	.579	.453	.344	.415	.419	.560

Note. Bolded items are significant at $p < .05$. N=218-220.

Table 10. Skewness and kurtosis of PCL items at 8 weeks postpartum

	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
PCL_1	2.214	.164	4.117	.327
PCL_2	4.244	.164	18.420	.327
PCL_3	4.394	.164	17.469	.327
PCL_4	2.260	.164	5.077	.327
PCL_5	3.204	.164	10.341	.327
PCL_6	2.766	.164	9.010	.327
PCL_7	3.507	.165	14.815	.328
PCL_8	2.359	.164	4.555	.327
PCL_9	3.098	.164	11.106	.327
PCL_10	3.861	.164	18.037	.327
PCL_11	2.664	.164	9.547	.327
PCL_12	3.922	.164	18.836	.327
PCL_13	2.220	.164	6.698	.327
PCL_14	4.521	.164	24.549	.327
PCL_15	2.755	.164	9.459	.327
PCL_16	10.013	.164	107.695	.327
PCL_17	2.732	.164	8.418	.327
PCL_18	4.121	.164	23.010	.327
PCL_19	2.512	.164	8.229	.327
PCL_20	2.373	.164	6.208	.327

Table 11. Correlations between PCL items at 12 weeks postpartum

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. PCL_1	--																		
2. PCL_2	.622	--																	
3. PCL_3	.625	.504	--																
4. PCL_4	.638	.564	.554	--															
5. PCL_5	.285	.299	.554	.559	--														
6. PCL_6	.544	.536	.557	.647	.471	--													
7. PCL_7	.493	.421	.707	.655	.652	.768	--												
8. PCL_8	.347	.317	.254	.322	.104	.407	.272	--											
9. PCL_9	.468	.438	.542	.467	.320	.502	.518	.311	--										
10. PCL_10	.536	.556	.517	.664	.490	.584	.604	.418	.596	--									
11. PCL_11	.466	.548	.507	.554	.402	.518	.557	.331	.644	.597	--								
12. PCL_12	.176	.091	.271	.226	.168	.161	.233	.066	.319	.293	.417	--							
13. PCL_13	.248	.148	.199	.220	.130	.257	.203	.148	.399	.320	.439	.599	--						
14. PCL_14	.448	.364	.486	.418	.306	.365	.363	.231	.486	.535	.560	.558	.507	--					
15. PCL_15	.375	.455	.488	.502	.408	.443	.483	.205	.548	.553	.614	.349	.374	.513	--				
16. PCL_16	-.049	.062	-.025	.101	-.028	.101	.048	.037	.029	.035	.028	.065	.101	.063	.139	--			
17. PCL_17	.417	.273	.381	.333	.235	.329	.422	.229	.408	.302	.410	.231	.296	.303	.397	.195	--		
18. PCL_18	.344	.344	.382	.331	.362	.396	.389	.153	.345	.234	.347	.160	.221	.135	.388	.045	.479	--	
19. PCL_19	.430	.381	.397	.344	.247	.322	.348	.228	.379	.455	.486	.453	.487	.503	.476	.107	.414	.380	--
20. PCL_20	.180	.326	.226	.249	.177	.240	.187	.160	.328	.289	.400	.325	.424	.319	.362	.126	.232	.258	.523

Note. Items bolded are significant at $p < .05$. $N = 211-214$.

Table 12. Skewness and kurtosis of PCL items at 12 weeks postpartum

	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
PCL_1	2.648	.167	7.456	.332
PCL_2	3.023	.166	9.003	.331
PCL_3	5.104	.167	26.394	.333
PCL_4	2.150	.166	5.199	.331
PCL_5	5.305	.166	32.641	.331
PCL_6	2.756	.166	8.517	.331
PCL_7	3.293	.167	12.271	.332
PCL_8	3.914	.167	18.778	.332
PCL_9	2.972	.167	9.269	.332
PCL_10	2.815	.167	8.435	.332
PCL_11	2.657	.166	7.090	.331
PCL_12	2.801	.167	8.918	.332
PCL_13	1.773	.167	3.009	.332
PCL_14	3.103	.167	11.793	.332
PCL_15	1.878	.167	3.924	.332
PCL_16	8.286	.167	67.286	.333
PCL_17	2.778	.167	9.003	.332
PCL_18	3.378	.166	14.363	.331
PCL_19	1.958	.166	5.116	.331
PCL_20	1.685	.166	2.205	.331

Table 13. Global fit indices for tested models

Model	<i>df</i>	χ^2/df	RMSEA (90% CI)	CFI	TLI
Pregnancy					
1 (Unidimensional)	170	2.254	.068 (.059, .077)	.947	.940
2 (King)	165	1.958	.060 (.050, .069)	.960	.954
2a (Hierarchical King)	166	2.079	.063 (.054, .073)	.955	.949
3 (Simms)	167	1.749	.053 (.043, .063)	.969	.964
3a (Hierarchical Simms)	169	1.741	.052 (.042, .062)	.969	.965
Four Weeks					
1 (Unidimensional)	152	2.619	.083 (.073, .093)	.892	.878
2 (King)	146	1.966	.064 (.053, .075)	.938	.928
2a (Hierarchical King)	148	2.285	.074 (.064, .085)	.917	.904
3 (Simms)	147	2.032	.067 (.056, .077)	.933	.923
3a (Hierarchical Simms)	149	2.152	.070 (.060, .081)	.925	.914
Eight Weeks					
1 (Unidimensional)	170	1.690	.056 (.045, .067)	.948	.942
2 (King)	164	1.567	.051 (.038, .062)	.959	.952
2a (Hierarchical King)	166	1.636	.054 (.042, .065)	.953	.947
3 (Simms)	165	1.570	.051 (.039, .062)	.959	.952
3a (Hierarchical Simms)	167	1.594	.052 (.040, .063)	.956	.950
Twelve Weeks					
1 (Unidimensional)	152	1.802	.061 (.050, .073)	.955	.950
2 (King)	146	1.550	.051 (.037, .063)	.971	.966
2a (Hierarchical King)	148	1.654	.055 (.043, .068)	.964	.959
3 (Simms)	147	1.492	.048 (.034, .061)	.973	.969
3a (Hierarchical Simms)	149	1.498	.048 (.035, .061)	.973	.969

Note. RMSEA=Root Mean Square Error of Approximation; CFI=Comparative Fit Index; TLI: Tucker Lewis Index; Model 2a:

Table 14. Factor correlations

	King Model				Simms Model			
	1	2	3	4	1	2	3	4
Pregnancy								
1. Intrusions	--				--			
2. Avoidance	.857	--			.863	--		
3. Emotional Numbing/Dysphoria	.886	.775	--		.876	.744	--	
4. Hyperarousal	.872	.717	.951	--	.757	.689	.742	--
Four Weeks								
1. Intrusions	--				--			
2. Avoidance	.853	--			.851	--		
3. Emotional Numbing/Dysphoria	.836	.638	--		.795	.586	--	
4. Hyperarousal	.684	.477	.870	--	.672	.518	.742	--
Eight Weeks								
1. Intrusions	--				--			
2. Avoidance	.941	--			.942	--		
3. Emotional Numbing/Dysphoria	.925	.827	--		.892	.809	--	
4. Hyperarousal	.839	.776	.958	--	.840	.764	.895	--
Twelve Weeks								
1. Intrusions	--				--			
2. Avoidance	.917	--			.917	--		
3. Emotional Numbing/Dysphoria	.845	.787	--		.843	.754	--	
4. Hyperarousal	.837	.697	.903	--	.768	.689	.747	--

Note. Bolded items are >.70 indicating poor discriminant validity.

Table 15. Structural models tested

DSM-5 PTSD Symptom	Model		
	1	2, 2a (King)	3, 3a (Simms)
Intrusions	P	I	I
Nightmares	P	I	I
Flashbacks	P	I	I
Emotional Reactivity	P	I	I
Physical Reactivity	P	I	I
Avoid Thoughts	P	A	A
Avoid Places	P	A	A
Amnesia	P	E	D
Guilt	P	E	D
Negative Emotions	P	E	D
Loss of Interest	P	E	D
Distant and Cutoff	P	E	D
Low positive Emotions	P	E	D
Irritability/ Anger	P	H	D
Reckless/self-destructive	P	H	D
Concentration	P	H	D
Sleep	P	H	D
Hypervigilance	P	H	H
Startle	P	H	H

Note. P=PTSD General Factor; I=Intrusions; A=Avoidance; E=Emotional Numbing; H= Hyperarousal; D=Dysphoria. Model 1= Unidimensional model; Model 2= King model; Model 2a: Hierarchical model using King subfactors; Model 3=Simms model; Model 3a=Hierarchical model using Simms subfactors.

Table 16. Correlations across all study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. PCLP	--																
2. OCIP	.574	--															
3. IDASP	.740	.575	--														
4. PCL4	.561	.405	.542	--													
5. OCI4	.467	.762	.506	.523	--												
6. IDAS4	.535	.447	.641	.763	.543	--											
7. PCL8	.555	.481	.576	.674	.464	.630	--										
8. OCI8	.410	.790	.523	.365	.829	.435	.532	--									
9. IDAS8	.496	.445	.639	.528	.436	.698	.825	.569	--								
10. PCL12	.522	.413	.490	.600	.495	.493	.805	.438	.651	--							
11. OCI12	.391	.693	.466	.480	.830	.461	.472	.867	.440	.598	--						
12. IDAS12	.424	.281	.505	.407	.281	.535	.659	.339	.713	.727	.454	--					
13. Subjective	.090	.019	.226	.163	.079	.240	.087	.003	.157	.144	.049	.149	--				
14. Objective	.137	.236	.239	.131	.249	.170	.248	.266	.291	.117	.282	.161	.189	--			
15. SOCSUP	-.322	-.171	-.393	-.156	-.136	-.231	-.206	-.150	-.257	-.254	-.112	-.294	-.189	-.040	--		
16. TRAUMA	.397	.310	.380	.234	.278	.194	.313	.261	.257	.246	.180	.125	.044	.140	-.325	--	
17. FOC	.330	.256	.443	.161	.175	.307	.298	.225	.356	.290	.195	.369	.403	.182	-.400	.159	--

Note. PCLP=PTSD measured during pregnancy; OCIP=OCD measured during pregnancy; IDASP=Depression measured during pregnancy; PCL4=PTSD measured 4 weeks postpartum; OCI4=OCD measured 4 weeks postpartum; IDAS4=Depression measured 4 weeks postpartum; PCL8=PTSD measured 8 weeks postpartum; OCI8=OCD measured 8 weeks postpartum; IDAS8=Depression measured 8 weeks postpartum; PCL12=PTSD measured 12 weeks postpartum; OCI12=OCD measured 12 weeks postpartum; IDAS12=Depression measured 12 weeks postpartum; SOCSUP=Social Support; Trauma=Number of traumatic events endorsed in history; FOC=Fear of Childbirth. Bolded items are significant at the $p < .05$ level.

Table 17. Diagnoses across time

	N (%)				
	PTSD	Depression	OCD	Mania	Hypomania
Lifetime	26 (9.3)	80 (28.7)	13 (4.7)	2 (.7)	1 (.4)
Baseline Current	1 (.4)	13 (4.7)	5 (1.8)	--	--
Baseline to four weeks pp	2 (.7)	3 (1.1)	4 (1.4)	--	--
Four Weeks Current	2 (.7)	11 (3.9)	6 (2.2)	--	--
Four to Twelve Weeks	2 (.7)	4 (1.4)	5 (1.8)	--	--
Twelve Weeks Current	2 (.7)	7 (3.2)	4 (1.4)	--	--

Note. PTSD=Posttraumatic Stress Disorder. OCD= Obsessive Compulsive Disorder.

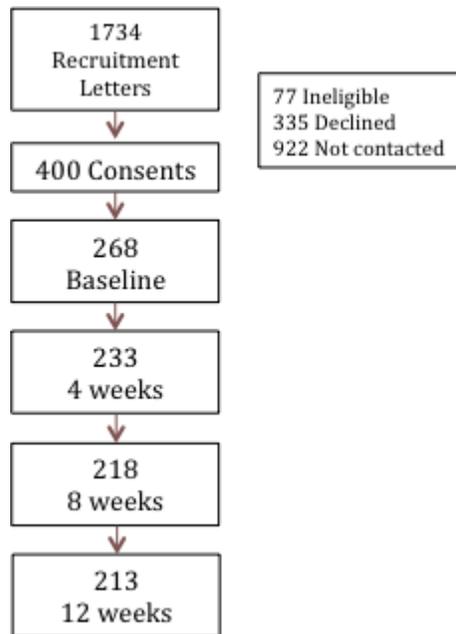
Table 18. Correlations between breastfeeding evaluation scale and study variables

	MBFES_4	MBFES_12
PCLP	-.016	.041
OCIP	-.068	.028
IDASP	-.095	-.025
PCL4	-.076	-.113
OCI4	-.085	.048
IDAS4	-.191	-.149
PCL8	.047	-.026
OCI8	.004	.040
IDAS8	.027	-.012
PCL12	.008	.015
OCI12	-.110	.006
IDAS12	.015	-.008
Subj	-.180	-.099
Obj	-.135	-.023
SOCSUP	.014	-.050
TRAUMA	.060	.112
FOC	-.220	-.099
MBFES_4	--	.731

Note. PCLP=PTSD measured during pregnancy; OCIP=OCD measured during pregnancy; IDASP=Depression measured during pregnancy; PCL4=PTSD measured 4 weeks postpartum; OCI4=OCD measured 4 weeks postpartum; IDAS4=Depression measured 4 weeks postpartum; PCL8=PTSD measured 8 weeks postpartum; OCI8=OCD measured 8 weeks postpartum; IDAS8=Depression measured 8 weeks postpartum; PCL12=PTSD measured 12 weeks postpartum; OCI12=OCD measured 12 weeks postpartum; IDAS12=Depression measured 12 weeks postpartum; SOCSUP=Social Support; Trauma=Number of traumatic events endorsed in history; FOC=Fear of Childbirth. Bolded items are significant at the $p < .05$ level.

FIGURES

Figure 1. Consort Diagram



Note. Not Contacted=Eligible participants who the research team could not reach via telephone after 3 attempts.

Figure 2. (Specific aim #1) Simms' Factor Structure of PTSD (2002)

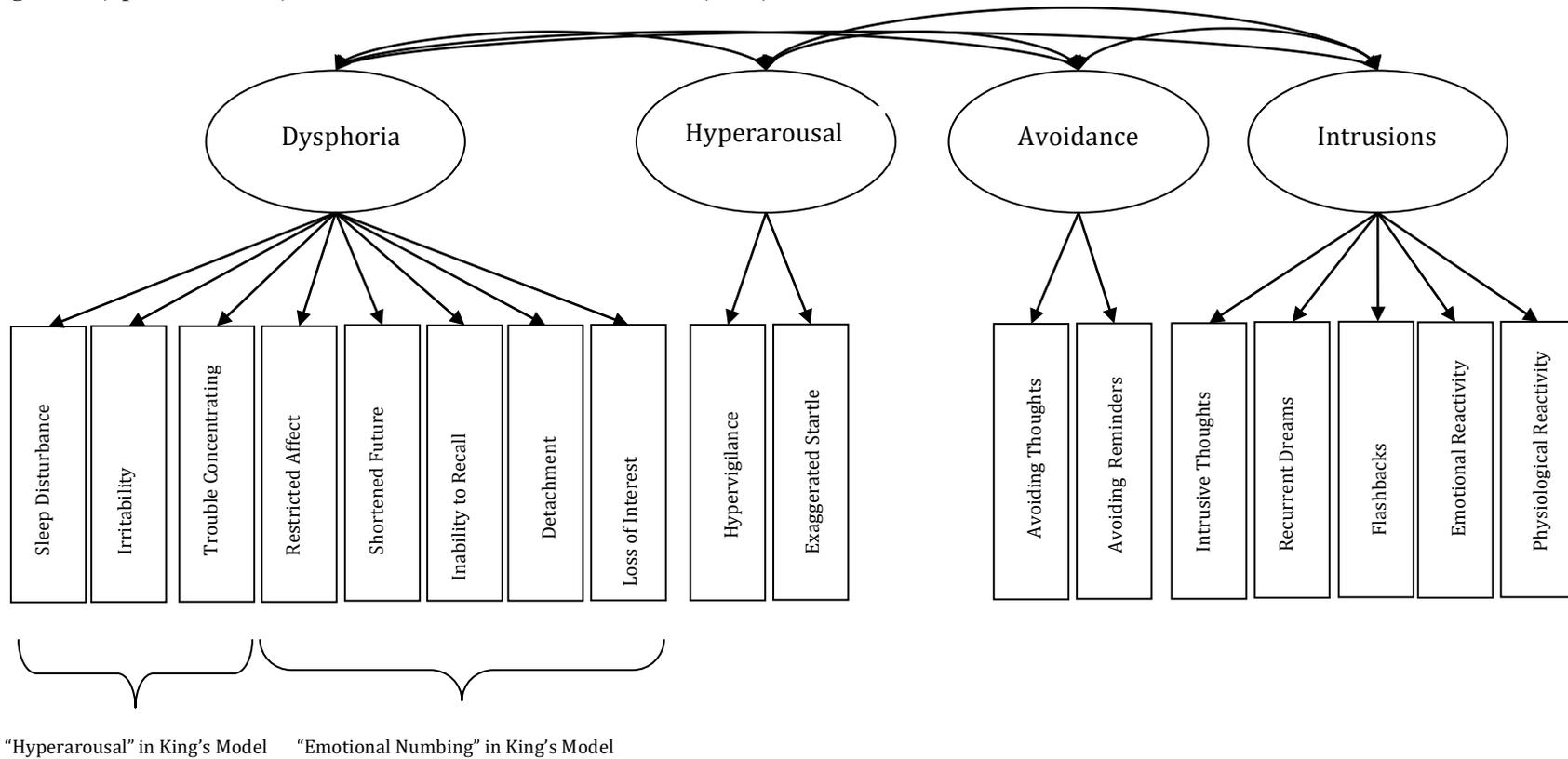


Figure 3. (Specific aim #1) King's Factor Structure of PTSD (1998)

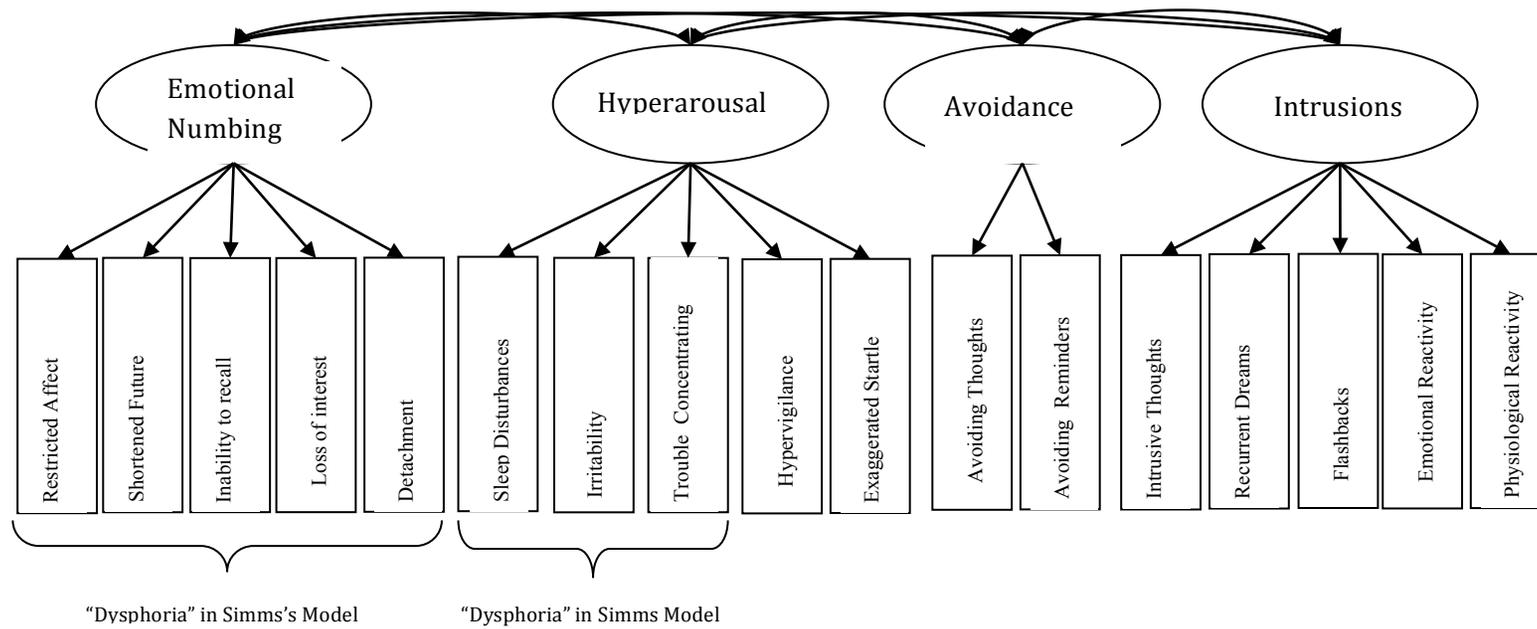


Figure 4. Full structural equation model

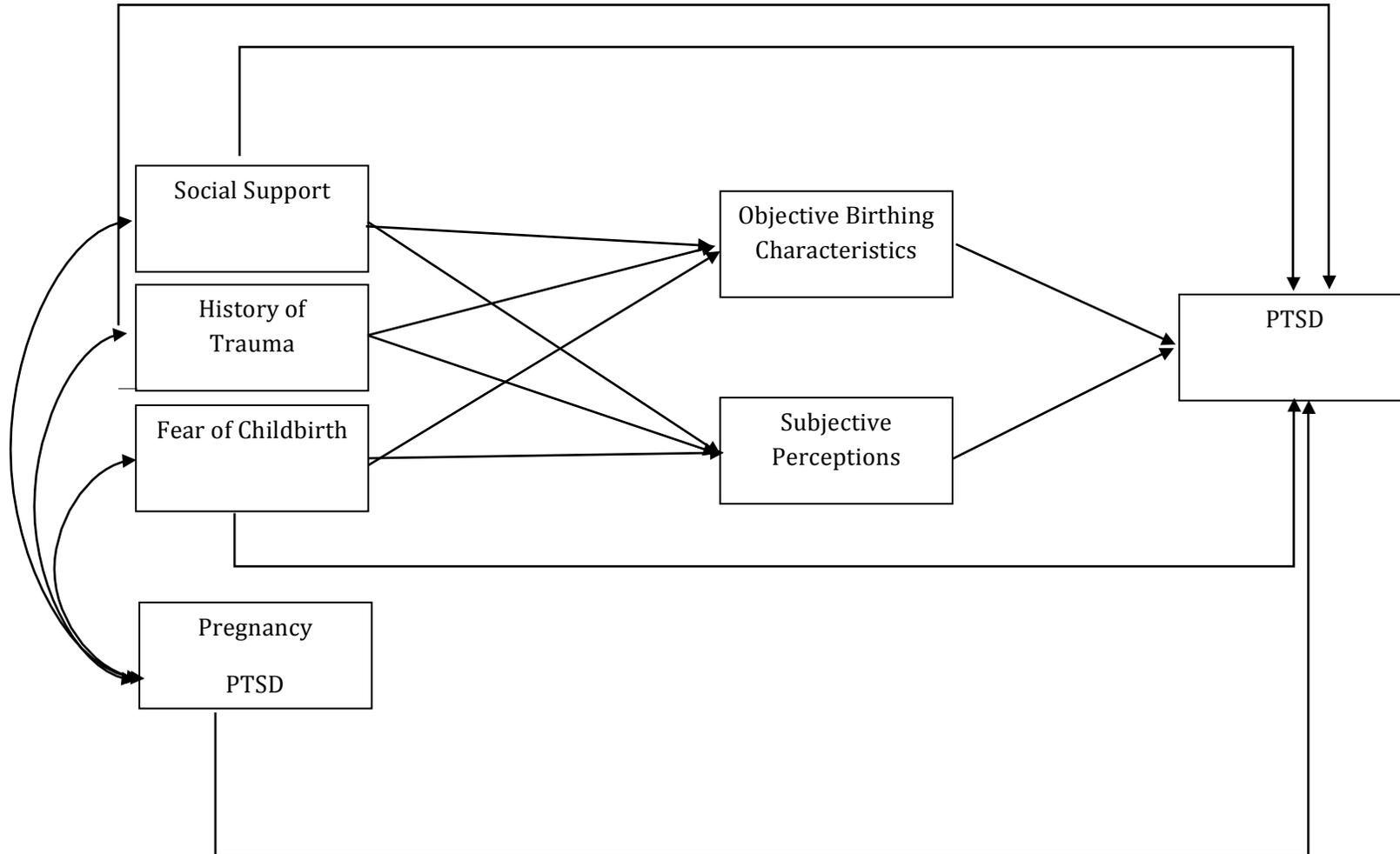
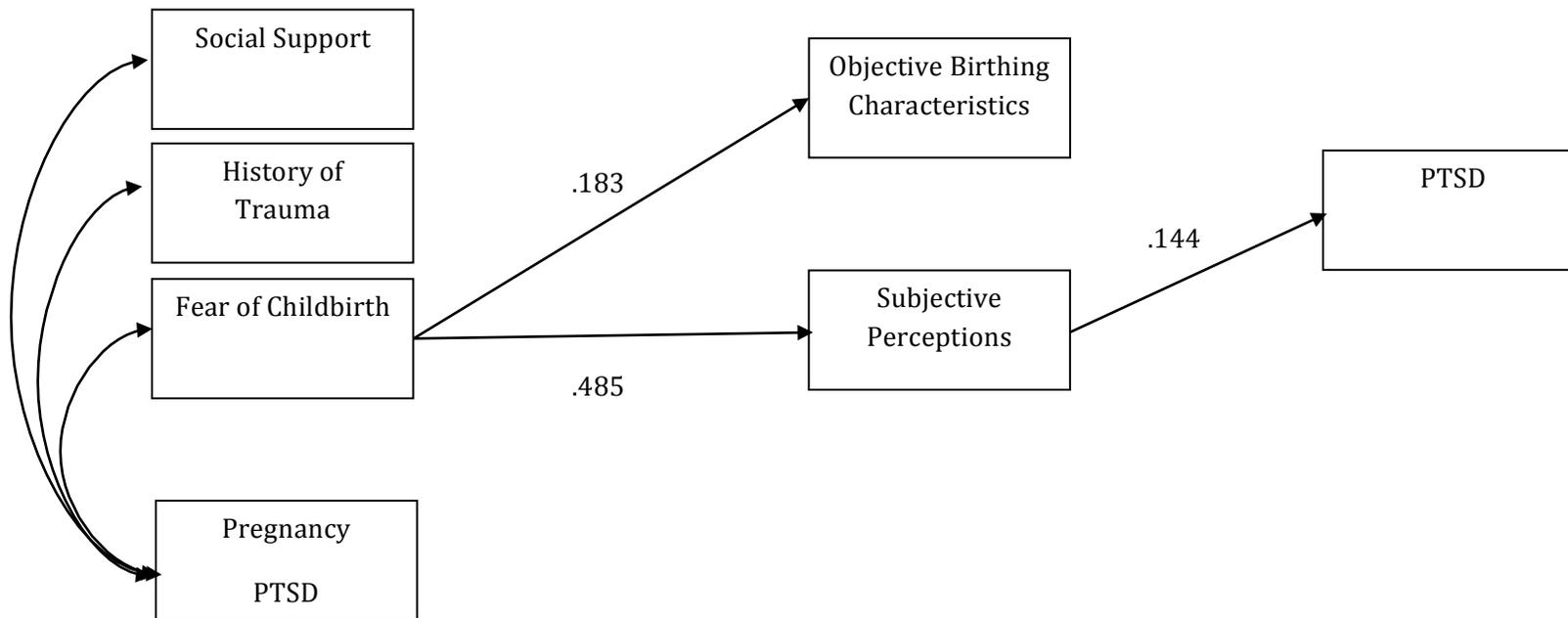
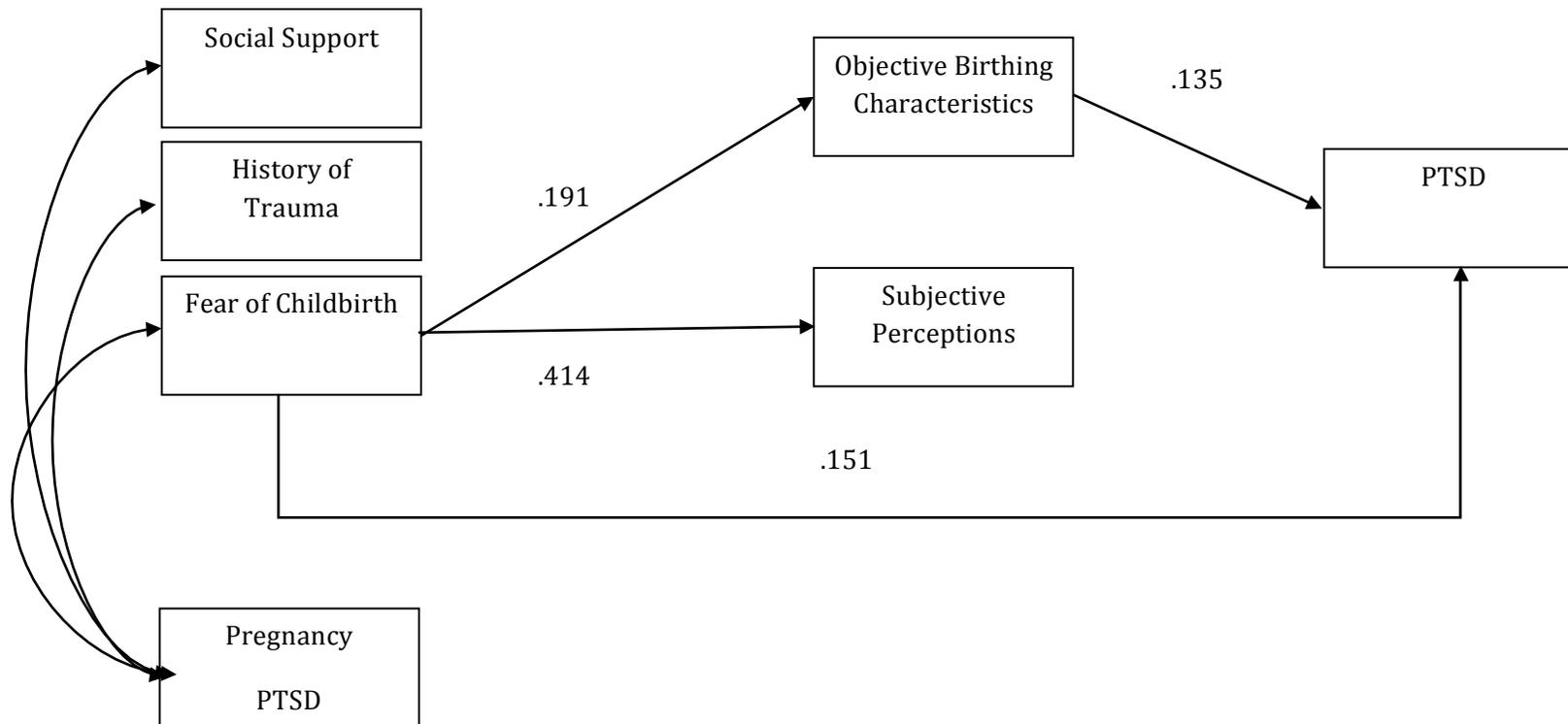


Figure 5. SEM focusing on PTSD at 4 week



Note. Only significant pathways are displayed. Path coefficients are standardized estimates.

Figure 6. SEM focusing on PTSD at 8 weeks postpartum



Note. Only significant pathways are displayed. Path coefficients are standardized estimates.

APPENDIX

Posttraumatic Stress Disorder Checklist-5

Instructions: Below is a list of problems that people sometimes have in response to a very stressful experience. Please read each problem carefully and then circle one of the numbers to the right to indicate how much you have been bothered by that problem in the past month.
Answer Options: Not at all, A Little Bit, Moderately, Quite a Bit, Extremely

1. Repeated, disturbing, and unwanted memories of the stressful experience?
2. Repeated, disturbing dreams of the stressful experience?
3. Suddenly feeling or acting as if the stressful experience were actually happening again (as if you were actually back there reliving it)?
4. Feeling very upset when something reminded you of the stressful experience?
5. Having strong physical reactions when something reminded you of the stressful experience (for example, heart pounding, trouble breathing, sweating)?
6. Avoiding memories, thoughts, or feelings related to stressful experience?
7. Avoiding external reminders of the stressful experience (for example, people, places, conversations, activities, objects, or situations)?
8. Trouble remembering important parts of the stressful experience?
9. Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?
10. Blaming yourself or someone else for the stressful experience or what happened after it?
11. Having strong negative feelings such as fear, horror, anger, guilt, or shame?
12. Loss of interest in activities that you used to enjoy?
13. Feeling distant or cut off from other people?
14. Trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)?
15. Irritable behavior, angry outbursts, or acting aggressively?
16. Taking too many risks or doing things that could cause you harm?
17. Being "superalert" or watchful or on guard?
18. Feeling jumpy or easily startled?
19. Having difficulty concentrating?
20. Trouble falling or staying asleep?

IDAS-GD

Inventory of Depression and Anxiety Symptoms- General Depression

The following is a list of feelings, sensations, problems, and experiences that people sometimes have. For each item select the best option that describes how much you have felt or experienced things this way during the past two weeks, including today. Answer Options: Not at all, A Little Bit, Moderately, Quite a Bit, Extremely

1. I felt exhausted.
2. I felt depressed
3. I felt inadequate
4. I felt fidgety, restless
5. I had thoughts of suicide
6. I slept very poorly
7. I blamed myself for things
8. I had trouble falling asleep.
9. I felt discouraged about things
10. thought about hurting myself
11. I did not have much of an appetite
12. I felt like eating less than usual.
13. I looked forward to things with enjoyment
14. I felt like I had a lot of energy
15. I had little interest in my usual hobbies or activities
16. I had trouble concentrating
17. I had trouble making up my mind
18. I talked more slowly than usual
19. I found myself worrying all the time
20. It took a lot of effort for me to get going

Traumatic Life Events Questionnaire The events described below are far more common than many people realize and can affect a person's mental health or later quality of life. Please indicate whether you have experienced any of these events with a yes or no answer. If you have experienced a certain event please also indicate when you experienced this event.

1. Have you experienced a natural disaster (flood, hurricane, earthquake, etc.)
2. Were you involved in a motor vehicle accident for which you received medical attention or that badly injured or killed someone?
3. Have you been involved in any other kind of accident which you or someone else was badly hurt?
4. Have you lived, worked, or had military service in a war zone?
5. Have you ever experienced the sudden and unexpected death of a close friend or loved one?
6. Has a loved one ever survived a life threatening or permanently disability accident?
7. Have you ever had a life-threatening illness?
8. Have you been robbed or been present during a robbery in which the robbers used or displayed a weapon?
9. Have you ever been hit or beaten up and badly hurt by a stranger or someone you didn't know very well?
10. Have you seen a stranger (or someone you didn't know very well) attack or beat up someone and seriously injure or kill him or her?
11. Has anyone threatened to kill you or cause serious physical harm?
12. Were you physically punished in a way that resulted in bruises, burns, cuts, or broken bones?
13. While growing up did you see or hear family violence?
14. Have you ever been slapped, punched, kicked, beaten up, or otherwise physically hurt by your spouse (or former spouse), a boyfriend or girlfriend, or some other intimate partner?
15. Did anyone touch sexual parts of your body or make you touch sexual parts of his or her body against your will or without consent?
16. Has anyone stalked you (followed you or kept track of your activities), causing you to feel intimidated or concerned for your safety?
17. Have you or an intimate partner ever had a miscarriage?
18. Have you or an intimate partner ever had an abortion?
19. Have you experienced (or seen) any other events that were life threatening, caused serious injury, or were highly disturbing or distressing? Briefly describe this experience

OCI-R

Obsessive Compulsive Inventory-Revised

The following statements refer to experiences that many people have in their everyday lives. Circle the number that best describes how much that experience has distressed or bothered you during the past month. Answer Options: Not at all, A little, Moderately, A lot, Extremely

1. I have saved up so many things that they get in the way.
2. I check things more often than necessary.
3. I get upset if objects are not arranged properly.
4. I find it difficult to touch an object when I know it has been touched by strangers or certain people.
5. I find it difficult to control my own thoughts.
6. I collect things I don't need.
7. I repeatedly check doors, windows, drawers, etc.
8. I get upset if others change the way I have arranged things.
9. I feel I have to repeat certain numbers.
10. I sometimes have to wash or clean myself simply because I feel contaminated.
11. I am upset by unpleasant thoughts that come into my mind against my will.
12. I avoid throwing things away because I am afraid I might need them later.
13. I repeatedly check gas and water taps and light switches after turning them off.
14. I need things to be arranged in a particular order.
15. I feel that there are good and bad numbers.
16. I wash my hands more often and longer than necessary.
17. I frequently get nasty thoughts and have difficulty getting rid of them.
18. I feel compelled to count while I am doing things.

MOS-SS

Medical Outcomes Social Support Survey

We would like to know about the support that is available to you.

About how many close friends and relatives do you have (people you feel at ease with and can talk to about what is on your mind)?

People sometimes look to others for companionship, assistance, or other types of support. How often is each of the following kinds of support available to you if you need it? Answer Options: None of the time, a little of the time, some of the time, most of the time, all of the time

1. Someone to help you if you were confined to bed
2. Someone you can count on to listen to you when you talk
3. Someone to give you good advice about a crisis
4. Someone to take you to the doctor if you needed it
5. Someone to have a good time with
6. Someone to give you information to help you understand a situation
7. Someone to confide in or talk to about yourself or your problems
8. Someone who hugs you
9. Someone to get together with for relaxation
10. Someone to prepare your meals if you were unable to do it yourself
11. Someone whose advice you really want
12. Someone to do things with to help you get your mind off things
13. Someone to help with daily chores if you were sick
14. Someone to share your most private worries and fears
15. Someone to turn to for suggestions about how to deal with a personal problem
16. Someone to do something enjoyable with
17. Someone who understands your problems
18. Someone to love and make you feel wanted

Wijma- Delivery Experiences Questionnaire-A

This questionnaire is about feelings and thoughts women may have at the prospect of labor and delivery.

The answers to each question appear as a scale from 0 to 5. The outermost answers (0 and 5 respectively) correspond to the opposite extremes of a certain feeling or thought.

Please complete each question by choosing the number belonging to the answer which most closely corresponds to how you imagine your labour and delivery will be.

Please answer how you imagine your labour and delivery will be - not the way you hope it will be.

How do you think your labor and delivery will turn out as a whole?

(Extremely Fantastic) 0—1—2—3—4—5 (Not at all fantastic)

(Extremely frightful) 0—1—2—3—4—5 (Not at all frightful)

How do you think you will feel in general during the labor and delivery?

(Extremely lonely) 0—1—2—3—4—5 (Not at all lonely)

(Extremely strong) 0—1—2—3—4—5 (Not at all strong)

(Extremely confident) 0—1—2—3—4—5 (Not at all confident)

(Extremely afraid) 0—1—2—3—4—5 (Not at all afraid)

(Extremely deserted) 0—1—2—3—4—5 (Not at all deserted)

(Extremely weak) 0—1—2—3—4—5 (Not at all weak)

(Extremely safe) 0—1—2—3—4—5 (Not at all safe)

(Extremely independent) 0—1—2—3—4—5 (Not at all independent)

(Extremely desolate) 0—1—2—3—4—5 (Not at all desolate)

(Extremely tense) 0—1—2—3—4—5 (Not at all tense)

(Extremely glad) 0—1—2—3—4—5 (Not at all glad)

(Extremely proud) 0—1—2—3—4—5 (Not at all proud)

(Extremely abandoned) 0—1—2—3—4—5 (Not at all abandoned)

(Totally Composed) 0—1—2—3—4—5 (Not at all composed)

(Extremely relaxed) 0—1—2—3—4—5 (Not at all relaxed)

(Extremely happy) 0—1—2—3—4—5 (Not at all happy)

What do you think you will feel during the labor and delivery?

(Extreme panic) 0—1—2—3—4—5 (No panic at all)

(Extreme hopelessness) 0—1—2—3—4—5 (No hopelessness at all)

(Extreme longing for the child) 0—1—2—3—4—5 (No longing for the child at all)

(Extreme self-confidence) 0—1—2—3—4—5 (No self confidence at all)

(Extreme trust) 0—1—2—3—4—5 (No trust at all)

(Extreme pain) 0—1—2—3—4—5 (No pain at all)

What do you think will happen when labor is most intense?

(I will behave extremely badly) 0—1—2—3—4—5 (I will not behave badly at all)

(I will allow my body to take total control) 0—1—2—3—4—5 (I will not allow my body to take control at all)

(I will totally lose control of myself) 0—1—2—3—4—5 (I will not lose control of myself at all)

How do you imagine it will feel the very moment you deliver the baby?

(Extremely enjoyable) 0—1—2—3—4—5 (Not at all enjoyable)

(Extremely natural) 0—1—2—3—4—5 (Not at all natural)

(Totally as it should be) 0—1—2—3—4—5 (Not at all as it should be)

(Extremely dangerous) 0—1—2—3—4—5 (Not at all dangerous)

Have you, during the last month, had fantasies about the labour and delivery, for example.....

Fantasies that your child will die during labour/delivery?

(never) 0—1—2—3—4—5 (very often)

Fantasies that your child will be injured during labor/delivery?

(never) 0—1—2—3—4—5 (very often)

Traumatic Events Scale

Below you will find a number of statements that women have used to describe how they felt after labor/delivery. Read every statement once and choose the answer (1-4) that best corresponds at present with your experience. There are no right or wrong answers! Answer Options: Not at all, somewhat, much, very much

1. How would you describe your labor/delivery?
2. The labor/delivery was a trying experience
3. During labor/delivery I felt physically offended
4. During labor/delivery I was afraid that I or my baby would be hurt or was going to die
5. During labor/delivery I felt anguished, helpless or horrified

How are you doing now? Please continue with the statements below and describe how you feel at present. Answer by marking 1 (not at all), 2 (rarely), 3 (Sometimes), 4 (often)

6. Unpleasant thoughts and images of the labor/delivery force themselves on me
7. I have unpleasant dreams about the labor/delivery
8. Suddenly I feel like the childbirth is recurring and I am filled with horrifying feelings
9. All reminders of my childbirth experience cause intense psychological distress
10. Reminders of the labor/delivery experience cause physical distress (i.e. heart beats faster, increased breathing, feeling tense, starting to sweat)
11. I try to stay away from thoughts, emotions, or conversations that might remind me of the childbirth experience
12. I try to avoid activities, places or persons that remind me of the labor/delivery experience
13. I have difficulties remembering important parts of the labor/delivery
14. I have difficulties being engaged in activities I enjoyed before giving birth
15. I feel detached or estranged from other people
16. My ability to love or be affectionate is restricted
17. I feel that my future is meaningless
18. I have difficulties falling or staying asleep because thoughts and memories of the labor/delivery disturb me
19. I can suddenly feel very irritated or angry for no reason
20. I find it difficult to concentrate
21. I always feel tense and alert
22. I react strongly to unexpected events
23. Now, please consider how much the items above have affected your daily life by marking a number from 0 (Does not affect me at all) to 10 (affects me very much), on the scale below

PES

Peripartum Events Scale

Demographic:

- Age < 18 or >35
- Unmarried
- Less than HS education

Past obstetric history

- Previous cesarean section, other uterine or cervical surgery, other uterine anomalies
- Previous perinatal death or SIDS
- Previous baby with congenital anomaly, mental retardation, or seizures
- Previous malpresentation, obstetric hemorrhage, positive Coombs test, or toxemia
- Three or more abortions
- Previous abnormally-sized infants (LGA or SGA) Previous preterm (< 37 weeks) or post term (>41 weeks) delivery
- Less than one year since previous delivery

Medical Risk factors

- Hypertension
- Heart disease
- Endocrine disease, inc. diabetes
- Kidney disease Pulmonary disease Gastrointestinal disease
- Seizure disorder
- Anaemia (HGB < 9.0)
- Extremes of prepregnant weight (<45 or >90 kg) Chemical abuse
- Other medical problems

Obstetric Risk factors

- abnormal weight gain (<4kg or >18kg)
- abnormal uterine size, inc. multiple pregnancy pre-eclampsia
- Significant bleeding
- abnormal presentation
- fever in labour
- meconium stained amniotic fluid

Indication for admission to labour and delivery

- Ruptured membranes > 12 hours without labour
- Vaginal bleeding
- Decreased fetal movement
- Pain other than labour
- premature labour
- infection
- indicated induction of labour (ex. postdates)
- previous cesarean section, in labour
- other

Progress in labour

- Precipitous (< 3 hours)
- Secondary arrest of labour-requiring oxytocin or pelvimetry
- Secondary arrest of labour-requiring both
- Requiring more than three analgesics during labour
- other

Method of delivery

- Midforceps
- Vaginal breech
- Cesarean section- Primary Cesarean section
- Repeat cesarean section
- vaginal multiple gestation
- other

Duration of Labour

- First Stage-Primigravidas >20 hours
- First stage- Multigravidas >14 hours
- Second Stage- Primigravidas >2 hours
- Multigravidas- 1 1/2 Hours
- Third Stage >30 minutes

Fetal Monitoring

- Electronic fetal heart rate monitoring (internal or external)
- Abnormal fetal heart rate monitoring
- Electronic contraction monitoring (internal or external)
- Abnormal contraction monitoring
- Fetal blood sampling performed
- Abnormal fetal blood sampling

Delivery Complications

- Blood loss >600cc
- Significant lacerations
- Puerperal infection
- Anaesthetic complications Manual removal of placental Other

Infant outcome

- <37 weeks or >41 weeks
- SGA or LGA
- One-minute APGAR <6
- Five-minute APGAR <8
- Need for pH correction
- Need for volume expansion
- Need for transfusion or exchange transfusion
- Hypoglycemia
- Hypocalcaemia
- Treatment for sepsis
- Meconium aspiration pneumonitis
- Other infant outcome

PLDS

Perceptions of Labor and Delivery Scale

We would like to know about your experience during labor and delivery. Please rate the following questions on a scale from 1 (not at all) to 10 (extremely)

1. At its worst, how severe was your pain during labour and delivery?
2. On average, how severe was your pain during labour and delivery?
3. How distressing did you find the pain you experienced?
4. In general, how distressing did you find the overall experience of labour and delivery?
5. How satisfied were you with the way you coped during labour and delivery?
6. How prepared did you feel during your labour and delivery?
7. At its worst, how fearful did you feel for yourself during your labour and delivery?
8. At worst, how fearful did you feel for your baby during your labour and delivery?
9. On average, how fearful did you feel for yourself during your labour and delivery?
10. On average, how fearful did you feel for your baby during labour and delivery?
11. How supportive were staff during your labour and delivery?
12. How much did you feel in control of what was happening in your labour and delivery?
13. How well-informed did you feel about the progress of your labour and delivery?
14. How much did you feel that your wishes and views were listened to by staff during your labour and delivery?
15. On the whole do you feel that you coped as well with your labour and delivery as others would have if they had been in your position?

Maternal Breastfeeding Evaluation Scale

Indicate your agreement or disagreement with each statement by choosing the best answer. Answer Options: Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree

1. Have you breastfed your infant at all since you delivered? Yes--No
2. With breastfeeding I felt a sense of inner contentment
3. Breastfeeding was a special time with my baby
4. I felt extremely close to my baby when I breastfed
5. It was important for me to be able to nurse
6. My baby and I worked together to make breastfeeding go smoothly
7. Breastfeeding was a very nurturing maternal experience
8. Breastfeeding was soothing when my baby was upset or crying
9. Breastfeeding was like a high of sorts
10. The fact that I could produce the food to feed my own baby was very satisfying
11. Breastfeeding made me feel like a good mother
12. I really enjoyed nursing
13. Breastfeeding made me feel more confident as a mother
14. Breastfeeding made my baby feel more secure
15. Breastfeeding felt wonderful to me