

1-2014

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Julian D. Ford

*University of Connecticut School of Medicine and Dentistry*

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## Recommended Citation

Ford, Julian D., "Complex Mental Health Sequelae of Psychological Trauma Among Women in Prenatal Care" (2014). *Articles - Research*. 259.

[http://digitalcommons.uconn.edu/uchres\\_articles/259](http://digitalcommons.uconn.edu/uchres_articles/259)



Published in final edited form as:

*Psychol Trauma*. 2014 January ; 6(1): 41–49. doi:10.1037/a0031467.

## Complex Mental Health Sequelae of Psychological Trauma Among Women in Prenatal Care

**Julia S. Seng,**

University of Michigan Institute for Research on Women and Gender

**Wendy D'Andrea,** and

New School for Social Research

**Julian D. Ford**

University of Connecticut School of Medicine

### Abstract

Pregnancy is a critical time to identify and address maternal mental health problems, for the health of both mother and child. Pregnant women with histories of exposure to interpersonal psychological trauma may experience a range of mental health problems including but not limited to posttraumatic stress disorder (PTSD). In a community sample of 1,581 pregnant women, 25% reported symptoms consistent with at least one of six syndromes, including PTSD, major depressive disorder (MDD), generalized anxiety disorder (GAD), or clinically significant dissociation, somatization, or affect dysregulation. Six sub-groups with distinct mental health problem profiles were identified by cluster analysis. Controlling for sociodemographic risk factors, women with histories of interpersonal trauma were over-represented in four sub-groups characterized by: (1) PTSD comorbid with depression (childhood sexual abuse), (2) PTSD comorbid with affect/interpersonal dysregulation (childhood physical or emotional abuse), (3) somatization (adult abuse), and (4) GAD (foster/adoptive placement). Findings suggest risk relationships warranting further study between different types of interpersonal trauma exposure and psychiatric outcomes in pregnant women, including PTSD with two types of comorbidity.

### Keywords

Women; Interpersonal Trauma; PTSD; depression; anxiety; dissociation; somatization; Comorbidity

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Impaired maternal perinatal mental health is of concern because of potential adverse impacts on not only the mother's health but also the child's health and development (Enlow et al., 2009). Generalized anxiety disorder (GAD) (Ross & McLean, 2006) and major depressive disorder (MDD) (Smith et al., 2004) are commonly detected and treated among pregnant women. Posttraumatic stress disorder (PTSD) also is prevalent among pregnant women (Seng et al., 2009; Seng, Rauch, Resnick et al., 2010). Moreover, prenatal PTSD places

mothers and infants at risk due to obstetric/pregnancy complications (Morland, Goebert, Onoye et al., 2007; Seng et al., 2001), lower birth weight and shorter gestation (Seng, Sperlich, Ronis, & Liberzon, 2011), and impaired postpartum mental health and bonding (Seng, Liberzon, Kane Low & Ronis, 2008).

PTSD may be just the part of the clinical picture for many pregnant women with trauma histories. When PTSD follows exposure to interpersonal psychological traumas (e.g., abuse, domestic violence) it typically is complicated by psychiatric comorbidities (Breslau, 2009). In addition, the sequelae of interpersonal psychological trauma do not always include PTSD (D'Andrea, Ford, Stolbach, & van der Kolk, in press). Several studies have shown that women exposed to interpersonal trauma are at risk for depression and anxiety disorders other than PTSD (Gill, Page, Sharps, & Campbell, 2008; Noll, 2005; Rayburn et al., 2005). In addition, clinically significant symptoms of dissociation, somatization, and affect dysregulation which are not part of the PTSD symptoms have been found to be associated in adults with a history of exposure to interpersonal trauma (van der Kolk, Roth, Pelcovitz, Sunday, & Spinazzola, 2005), particularly when multiple types of trauma have been experienced (Briere, Kaltman & Greene, 2008; Cloitre et al., 2009). For example, among young women, Ford, Stockton, Kaltman and Green (2006) found that a history of repeated interpersonal trauma exposures, as opposed to single incident or non-interpersonal trauma, was related to somatization, dissociation and affect dysregulation symptoms independent of whether they developed PTSD or not.

Women are more likely than men to experience interpersonal traumas (other than combat violence), in childhood and in adulthood (Tolin & Foa, 2006). Pregnant women have been found to be at particularly high risk for exposure to interpersonal violence (Kendall-Tackett, 2007), and adult exposure to violence has been shown to be associated with problems with somatic/physical health, dissociation, and emotion dysregulation (Breslau, 2009). Pregnant women with childhood abuse histories have been found to have a 12-fold increased risk of prenatal PTSD (Seng et al., 2009), which, in turn, was associated with lower birth weight and shorter gestation (Seng et al., 2009, 2011). Childhood abuse also places pregnant women at high risk for somatic, dissociative, and interpersonal/affect regulation problems, although these are detected and treated in only a minority of obstetric cases (Smith et al., 2006; Tam & Chung, 2007). However, no study to date has systematically investigated the association between a history of exposure to different types of psychological trauma, in childhood and in adulthood, with not only PTSD but also—independently or comorbidly—with GAD, MDD, somatization, dissociation, and affect dysregulation. Therefore, the present study was conducted as a series of secondary analyses of data collected from a sample of women in perinatal care, in order to test the hypothesis that a history of interpersonal trauma exposures would be associated with not only PTSD but also depression, generalized anxiety disorder, somatization, dissociation, and affect dysregulation.

The study sample included a substantial sub-group who had one or several risk factors for pregnancy and postnatal complications. The risk factors included being of minority ethnocultural background, having limited (High School or less) education, living in violent communities, and being young (18–20 years old). Consistent with the conservation of

resources theoretical model of psychological trauma and its aftereffects (Schumm et al., 2006), these ethnocultural and sociodemographic factors also have been found to be associated with increased risk of PTSD and other anxiety, depressive, and physical health problems in community and healthcare samples of women (Acierno et al., 1999; Engelhard et al., 2001; Gill et al., 2008; Levendosky et al., 2004; Rayburn et al., 2005; Schumm et al., 2006; Seng et al., 2009; Vogel & Marshall, 2001). Thus, the study was designed to test the specificity of relationships between exposures to psychological trauma and mental health sequelae, controlling for the effects of these important risk factors.

## Method

### Design and Setting

The STACY (Stress, Trauma, Anxiety, and the Childbearing Year) Project prospectively followed women receiving perinatal care in clinics in the Midwestern United States, one in a university city and two in a nearby urban area. Approval was granted by the Institutional Review Boards of the three health systems where participants were recruited. Secondary analyses that are reported in this paper are based on data from the initial interview, conducted in early pregnancy. Details about recruitment and measure (Seng et al., 2009) are briefly summarized here.

### Sample

Women initiating prenatal care were invited to participate in a survey “about stressful events that happen to women, emotions, and pregnancy” by nurses conducting obstetric intake health histories. The sample consisted of women who were identified as eligible and contacted to participate, based on being at least 18 years old (range = 18–47 years), expecting a first infant, at less than 28 weeks’ gestation, and English fluent, who provided verbal informed consent and completed the 30–40 minute structured computer-assisted telephone interview between August 2005 to July 2008 ( $N = 1,581$ ; response rate >75%). Participants’ ethnocultural backgrounds included European American (46%;  $N = 725$ ), African American (45%;  $N = 709$ ), Asian American (7%;  $N = 113$ ), and Native American (2%;  $N = 23$ ), with 4% ( $N = 67$ ) of Hispanic ethnicity. Almost half lived in high crime neighborhoods (41%;  $N = 645$ ) and had high school or less education (46%;  $N = 731$ ). One in four were 18–20 year olds (24%;  $N = 377$ ) and living in poverty (<\$15,000 income) (23%;  $N = 357$ ). Thirty percent ( $N = 470$ ) had been in some form of individual therapy, and 14% ( $N = 216$ ) had been on psychiatric medications.

### Measures

Lifetime history of trauma exposure was ascertained using the 29-item Life Stressor Checklist (LSC), a measure designed to assess potentially psychologically traumatic events with women (Wolfe & Kimerling, 1997). Items assess events ranging from physical abuse to miscarriage to accidents; follow-up questions ask about age and impact of events.

Dichotomous variables were constructed to represent the presence/absence of adult or childhood (younger than age 16) exposure to physical abuse (1 item) and sexual abuse (2 items, including contact and penetration), childhood emotional abuse and neglect (2 items) and foster/adoptive placement (1 item), and lifetime non-interpersonal trauma (19 items).

Foster/adoptive placement was used as a proxy for early childhood maltreatment and caregiver loss.

Current (past month) PTSD symptoms and diagnoses were assessed using the National Women's Study (NWS) PTSD module (Resnick, Kilpatrick, Dansky, Saunders & Best, 1993). Past year MDD and past year GAD were assessed using the short form of the Composite International Diagnostic Interview (CIDI) (Wittchen, 1994).

Dissociation symptoms were measured with the eight-item Dissociative Experiences Scale-Taxometric Version (DES-T) (Waller, Carlson, & Putnam, 1996). In this study,  $\alpha = .72$ . Somatization symptoms in the year prior to pregnancy (in order to avoid confounds with pregnancy-related somatic complaints) and current (past seven days) interpersonal sensitivity (i.e., difficulties in relationships related to affect dysregulation) symptoms were measured with the Symptom Checklist 90 (SCL-90) (Derogatis, 1983). The 13-item somatization subscale had  $\alpha = .75$ ; the 10-item interpersonal sensitivity subscale had  $\alpha = .83$ .

Three sociodemographic factors that are risks for pregnancy problems—African American race, low education (High School or less), and low income (<\$15,000 annual family income) were assessed with the Perinatal Risk Assessment Monitoring Survey (PRAMS), a surveillance instrument created by the Centers for Disease Control (Beck et al, 2002). Two additional factors, young age (<21) and living in a neighborhood characterized by crime (median split based on the total crime index from the most recent (2000) FBI uniform crime report for each woman's zip code).

### Statistical Analyses

Caseness was defined for dissociation, somatization, and affect dysregulation with a cutoff of scores greater than two standard deviations above the mean for the scale. A cumulative sociodemographic risk index was created by counting the number of risk factors (range = 0 to 5).

Descriptive statistics were calculated for the demographic, psychological trauma, and psychiatric symptom measures. Two-step cluster analyses were conducted using SPSS version 17 with maximum likelihood estimation (due to using categorical variables, i.e., disorder diagnoses or caseness categorizations) and the Schwarz Bayesian Criterion (Schwartz, 1978).

Next, a series of step-wise logistic regression models were done, comparing members of each cluster with all other participants on trauma history (questions two and three) and severity of the PTSD symptom features (question four). The PTSD symptom of psychogenic amnesia was entered separately from the three formal PTSD symptom subsets because it is the only PTSD symptom primarily intended to assess dissociation.

## Results

### Psychological Trauma History

Most participants ( $N=1470$ ; 93%) reported at least one potentially traumatic event. More than one-third ( $N=543$ ; 34%) reported interpersonal trauma, including: childhood sexual abuse ( $N=218$ , 14%), adult physical abuse ( $N=196$ , 12%), childhood physical abuse ( $N=157$ , 10%), adult sexual trauma ( $N=112$ , 7%), and childhood emotional abuse/neglect ( $N=166$ , 4%). Five percent ( $N=75$ ) had been fostered or adopted. A majority of participants ( $N=927$ , 59%) reported only non-interpersonal traumatic events (overall  $M = 4.0$  types,  $SD = 2.7$ ; range = 0–15).

### Prevalence of Psychiatric Disorders and PTSD Comorbidity

Altogether 395 (25%) participants met the criteria for a PTSD, MDD, or GAD diagnosis or clinically significant somatization, affect dysregulation, or dissociation. MDD was most prevalent ( $N=194$ ; 12%), followed by PTSD ( $N=125$ ; 8%). GAD and each of the dissociation, affect dysregulation, and somatization case syndromes were present in approximately 5% ( $N=69-89$ ) of the total sample.

PTSD and the other diagnoses/syndromes often occurred comorbidly (Table 1). MDD and the affect dysregulation syndrome occurred comorbidly with approximately one third of the PTSD cases, while the somatization and dissociation syndromes occurred comorbidly with approximately one in four PTSD cases. GAD cases were least often comorbid with PTSD, but still occurred comorbidly with one in seven PTSD cases. On the other hand, PTSD occurred often as a comorbidity with the other diagnoses/syndromes. PTSD occurred comorbidly with more than half of the affect dysregulation cases, more than one third of the dissociation and somatization cases, and approximately one fourth of the GAD and MDD cases. Thus, PTSD comorbidity was common in all disorders, and PTSD typically involved at least one comorbidity.

### Cluster Analysis

Seven groups were identified in the cluster analysis (Table 2). Healthy women met none of the “case” criteria ( $N=1,186$ ), while 395 women met criteria for at least one diagnosis/case type. Six mutually exclusive psychiatric clusters emerged. Four groups were predominantly defined by one diagnosis or case syndrome (Depression, GAD, Dissociation, Somatization). A comorbid PTSD cluster included 49% of all PTSD cases, and also 12% of the MDD cases and 18% of the somatization cases. Only eight women in this cluster had PTSD with no comorbidity. An affect/relational dysregulation cluster included women meeting criteria for several disorders: 93% of the affect dysregulation cases, 30% of the PTSD cases, 20% of the somatization cases, 18% of the dissociation cases, 17.5% of the MDD cases, and 16% of the GAD cases.

### Trauma Exposure, Posttraumatic Stress Symptoms, and Cluster Membership

Seven multivariate logistic regression models were calculated, including one for the Healthy cluster, each comparing one cluster’s members to all other participants (Table 3). As

expected, trauma history and PTSD symptoms decreased the odds of being in the Healthy cluster. Past foster/adoptive placement increased the odds of being in the Healthy cluster.

In the first step of the regressions, non-abuse trauma increased the odds of membership in four clusters by 10–20% (Table 3). Adult abuse trauma increased the odds only of being in the Somatization cluster. Foster/adoptive placement increased the odds of being in the GAD cluster. Childhood emotional abuse/physical neglect and childhood physical abuse were associated with increased likelihood of membership in the Affect/Relational Dysregulation cluster. Childhood sexual abuse increased the odds of being in the Comorbid PTSD cluster. Variance explained by trauma history (Nagelkerke's  $R^2$ ) varied from 2% for Depression cluster membership to 24% for Affect/Relational Dysregulation cluster membership.

In the second step of the models, the additional effects of PTSD criteria B, C, and D symptoms and psychogenic amnesia were examined. Criterion B (intrusive re-experiencing) PTSD symptoms increased the odds only of being in the two PTSD clusters. Criterion C (avoidance and numbing) PTSD symptoms increased the odds of membership in all psychiatric clusters except Somatization. Criterion D (arousal) PTSD symptoms increased the odds of being in the Comorbid PTSD and GAD clusters. Psychogenic amnesia increased the odds only of being in the Affect/Relational Dysregulation cluster. Somatization cluster membership was unrelated to PTSD symptoms. More than 40% of the variance in membership in both the Healthy cluster and the Affect/Relational Dysregulation cluster were explained in the final model, and 35% of variance in membership in the Comorbid PTSD cluster was explained.

## Discussion

This study adds specificity to prior findings of psychiatric morbidity among pregnant women (Gold & Marcus, 2008) by identifying six empirically-derived clusters closely mirroring *a priori* diagnoses/syndromes. Furthermore, it is consistent with research which suggests that “pure” PTSD may be the exception, particularly among women with abuse histories (Briere et al., 2008; Ford et al., 2006; van der Kolk et al., 2005), replicating and extending these findings with a prenatal sample of socioeconomically diverse women. One in four pregnant women met criteria as a diagnostic or syndromal “case” of MDD, GAD, PTSD, somatization, dissociation, or affect dysregulation. This is similar to the National Comorbidity Study-Replication's 26% estimated 12-month prevalence of adults with one or more psychiatric disorders (Kessler, Chiu, Demler, Merikangas, & Walters, 2005) and the estimated 20% 12-month prevalence of women with either major depression, PTSD, or alcohol/substance use disorders in the National Survey of Women (Zinzow et al., 2011). Underscoring the importance of assessing pregnant women for PTSD, two PTSD-specific clusters had extensive comorbidity and histories of psychological trauma. However, women in every diagnosis/syndromal-based cluster reported elevated rates of past psychological trauma, suggesting that a history of psychological trauma may place pregnant women at risk for a wide range of mental health problems that are not limited to PTSD.

Although no woman in the depression sub-group met criteria for PTSD, these women were at risk for having experienced non-interpersonal traumas such as severe accidents or



traumatic losses of loved ones. The potential impact of those psychological traumas therefore should be considered when evaluating and providing medical or mental health treatment for pregnant women who are depressed but do not have PTSD. This is consistent with findings indicating that depression in the absence of PTSD may be a sequela of traumatic exposure that is distinct behaviorally and biologically from comorbid depression and PTSD (Yehuda, 2001).

The Affect/Relational Dysregulation cluster was characterized by complex trauma histories and symptoms, consistent with descriptions of complex variants of PTSD (Ford et al., 2006; van der Kolk et al., 2005). Consistent with those studies, emotional/relational trauma was more strongly associated with Affect/Relational Dysregulation cluster membership than with any other cluster, including comorbid PTSD. The finding of heightened intrusive re-experiencing symptoms in the Affect/Relational Dysregulation clusters is consistent with a previous study with men which found that extreme intrusive re-experiencing was a hallmark of complex PTSD (Ford, 1999). The unique association between the Affect/Relational Dysregulation cluster and posttraumatic psychogenic amnesia also is consistent with reports linking childhood abuse, affect dysregulation, and dissociation (Ford et al., 2006; Putnam, 2003). Based on the finding in the NCS-R (Kessler et al., 2005) of two empirically-derived sub-groups representing 2.3% of the population which were characterized by prevalent PTSD (23–55%), depression (89–95%), GAD (39–51%), and affect dysregulation (intermittent explosive disorder, 40%), future studies should test whether some pregnant women with affect dysregulation problems also meet criteria for any of the other anxiety (e.g., agoraphobia, social phobia, panic), affective (e.g., bipolar), and behavior (e.g., ADHD, substance use) disorders that were prevalent in this NCS-R sub-group.

Taken together, the comorbid PTSD and affective/relational dysregulation clusters represented almost as many cases as in the more commonly detected depression and GAD clusters, with potentially more severe impairment and complex comorbid symptomatology. Their more extensive histories of childhood maltreatment also suggest greater risk for intergenerational transmission of both abuse and psychiatric vulnerability (Zajac & Kobak, 2009). Evidence-based treatments for PTSD (Friedman, Keane, & Resick, 2007) and affect dysregulation (Cloitre et al., 2010; Ford, Steinberg, & Zhang, in press) should be assessed for their safety and efficacy with pregnant women. Programs designed to address the childbearing needs of pregnant women affected by abuse-related PTSD also should be developed (Seng, Sperlich et al, 2011; Sperlich et al, 2011).

In contrast to a recently proposed dissociative sub-type of PTSD (Lanius et al., 2010), however, dissociation and somatization represented distinct clusters that were characterized only by non-abuse trauma and adult abuse trauma, respectively. The dissociation and somatization clusters' combined 105 members had very limited or no comorbidity with PTSD, MDD, or GAD, while comprising 7% of the entire sample and over 25% of the sub-sample of clinical cases. It is possible that when dissociation or somatization is the primary clinical feature, that self-reported emotional distress may be minimal because these psychic defense mechanisms are “working.” Consistent with prior findings that somatoform disorders focus on somatic complaints (Tam et al., 2007), women experiencing somatization may not endorse PTSD symptoms or emotional distress but instead may experience somatic



reactions to adult abuse (Samelius, Wijma, Wingren, & Wijma, 2007). This is clinically relevant because poor maternal physical well-being is associated with poor young child outcomes (Graham-Bermann & Seng, 2005), and somatization is associated with altered patterns of health care utilization (Tam et al., 2007). Therefore, the somatization cluster warrants study to identify problematic posttraumatic patterns of infant care and pediatric health care utilization that may compromise infant health. Pregnant women who primarily report pathological dissociation also may need anticipatory guidance about parenting under stress. However, study results suggest these women may be difficult to identify due to their apparently normal reporting of trauma history as well as of PTSD and other psychiatric symptoms.

This study has several limitations. The potential recall and reporting biases of self-report trauma history assessment may have contributed to the unexpected finding that women in the dissociation cluster infrequently reported childhood trauma. The sample was designed to be prospective, therefore restricting enrollment to women attending a prenatal clinic who initiated care at less than 28 weeks of gestation and possibly excluding severely disadvantaged or psychiatrically impaired women who may come late or not at all to prenatal care. The invitation to participate in the interview stated explicitly that the topic was “stressful things that happen to women, emotions, and pregnancy,” so some trauma survivors with avoidant tendencies may have declined to participate, thus possibly resulting in an underestimation of the prevalence and importance of trauma and PTSD in this sample; however, no data were collected on women who did not participate. In addition, the sample included substantial representation of women at risk for pregnancy problems and PTSD, due to recruiting half of the sample at two inner city clinics, and the results thus cannot be generalized to all perinatal clinic patients. The present analyses also did not examine differences across racial or ethnic groups, age cohorts, or other demographic variables that may affect the symptom patterns identified.

On the other hand, study strengths included recruitment of a large, diverse, community sample of pregnant women who were well-characterized with established psychiatric measures and with an omnibus trauma history questionnaire that used behaviorally specific items. The specificity of PTSD symptoms as opposed to similar pregnancy phenomena that may erroneously be reported as PTSD symptoms has been demonstrated by prior analyses with this sample (Seng et al., 2009). The cluster analysis procedure, while requiring replication, provided an empirical basis for describing syndromal sub-groups warranting further research. The inclusion of a sizable (>40%) sub-sample of African American women addresses chronic concerns of under-involvement of African Americans in medical research (Shavers-Hornaday & Lynch, 1997).

Study findings have numerous clinical, service delivery, and research implications from a maternity care perspective. First, perinatal mental health assessment should be trauma-informed, beginning with assessment of past and current abuse, as is the standard of care (Jones & Horan, 2002), and proceeding to assess PTSD itself, and the spectrum of comorbidities and associated features included here. The prominent role of PTSD avoidance symptoms in every sub-group except the somatization cluster also suggests women in obstetric care who present with a range of psychological or psychiatric symptoms should be

screened for avoidance of those memories and emotional numbing as well as for the often more evident problems with intrusive memories which are the hallmark of PTSD and trauma-related emotional dysregulation.

Second, sociodemographic risk factors should not be overlooked in screening traumatized women in perinatal care. Even for women with extensive abuse trauma histories, the presence of sociodemographic risks added additional risk of both GAD and affect dysregulation problems. In addition, interpersonal trauma occurring in adulthood added to the risk of somatization problems, consistent with research with obstetric and other healthcare patient samples showing that women who are subjected to adult interpersonal trauma (e.g., domestic violence, rape) are at risk for severe physical health symptoms that often are refractory to treatment (Kendall-Tackett, 2007).

Third, study results indicated that women who report PTSD avoidance and numbing symptoms and meet diagnostic criteria for major depression in the absence of histories of interpersonal trauma should be assessed for non-interpersonal trauma history. They may represent a large sub-set of pregnant women, since one in eight women in the present sample (and half of all pregnant women with mental health difficulties) met criteria for depression. Although they may benefit from empirically-based perinatal depression interventions that are not trauma-informed, those with non-abuse trauma experiences may need treatment or prevention services that also address posttraumatic precipitation or exacerbation of depression symptoms.

Fourth, a subset of women reported no abuse history and no “hallmark” intrusive-reexperiencing symptoms, but reported arousal (criterion D) symptoms and met GAD diagnostic criteria. Evidence-based anxiety disorder interventions focused on pregnancy-related concerns may benefit them. Attachment-based insecurity related to stressors such as past foster/adoptive placements appears to be of more concern for these women than posttraumatic hyperarousal. As noted above, they also are likely to be experiencing stress related to sociodemographic risks.

Fifth, somatic complaints are common in pregnancy, but study findings indicate that a sub-group of pregnant women may be clinically impaired by somatization. Approximately half of these women reported clinically significant PTSD, affect dysregulation, or dissociative symptoms, but the other half did not. The latter sub-group was identified as a distinct cluster, and women in that cluster were likely to have been battered or raped in adulthood. This finding is consistent with prior research and calls for assessing past (or ongoing) exposure to traumatic violence in adulthood appears indicated with pregnant women who do not report PTSD symptoms but have clinically significant somatization (Kendall-Tackett, 2007).

Sixth, an even larger sub-group of pregnant women reported clinically severe dissociative symptoms, consistent with observations of obstetrics providers who conduct physical examinations during pregnancy and labor (Kennedy & McDonald, 2002). These women almost exclusively were in a dissociation cluster (which was unrelated to trauma exposure except non-interpersonal trauma) or in the affect dysregulation cluster (which was related to

childhood interpersonal trauma exposure), and infrequently met criteria for PTSD (although often reporting PTSD avoidance symptoms). Thus, a sub-group of pregnant women may experience severe dissociation in the absence of evident PTSD or affect dysregulation (Putnam, 2003). A key clinical and research question warranting further study is suggested by their tendency to report PTSD avoidance and emotional symptoms: are some of these women under-reporting trauma histories as a result of severe dissociation? If this is the case, trauma-informed treatment may be indicated using present-focused strategies designed to help them manage dissociative symptoms (Courtois & Ford, 2009), particularly to prevent intrusive re-experiencing or affect dysregulation during intrusive medical procedures and the stress of labor, delivery, and perinatal child care.

It is of note that women in the “healthy” cluster were more likely than women reporting clinically significant psychological problems to report having been placed in foster care. This relationship no longer held when PTSD symptoms were added to the multivariate model, in contrast to a robust finding that women qualifying for GAD were four times more likely than all other women in this perinatal sample to have been placed in foster care. An intriguing possibility warranting further investigation is that foster care (and the services normally accompanying it) may have served the intended effect of mitigating exposure to childhood interpersonal trauma but may have left some women with a psychological legacy of anxiety problems consistent with having had insecure attachment experiences in childhood.

Finally, no “simple PTSD” group emerged, although eight women with PTSD and no other case-level problems were identified. Instead, women with PTSD were likely to either have comorbid depression and somatization problems or a broader range of emotional and relational dysregulation problems associated with complex forms of PTSD (Ford, 1999; van der Kolk et al., 2005). Classen, Pain, Field, and Woods (2005) similarly identified PTSD sub-groups among women characterized primarily by either posttraumatic dysphoria and somatic symptoms (similar to the current study’s comorbid PTSD and somatic clusters) or affect dysregulation and relational problems (similar to the affect dysregulation sub-group). Thus, maternity and obstetric providers may need to consult with, and possibly make referrals to, mental health professionals who have expertise in treating not only depression and GAD but also trauma-related affective, anxiety, and somatic problems. Mental health consultation may be particularly needed with a sub-group of perinatal women who do not have evident psychological symptoms but are severely dissociative.

In a broader sense, study findings suggest that state-of-the-science mental health services for perinatal psychiatric morbidity may be most efficacious if treatment is tailored to address specific syndromes and informed by the impact of different types of trauma history. Clinical time is extremely limited in obstetric settings, and midwives and obstetricians have limited proficiency in mental health assessment or treatment. The interview for this study averaged 33 minutes, including obtaining informed consent for research, verifying research study eligibility, and other questions used only for the research (e.g., demographics). Part of the time used was to assess abuse history and perinatal depression and anxiety, which already are standards of care implemented in many settings. Our research interview assessment components were conducted by telephone with lay interviewers. This suggests the

assessment could be conducted by nurses, social workers, or outreach workers as part of an intake medical and social history in low-literacy settings where face-to-face processes are needed. Where it is possible to use paper forms, supplementing existing screening with very well-established measures that are straightforward checklists could be done. It is likely that 20 minutes of a staff member's time or of the patient's time alone while waiting to see the clinician would suffice to gather a thorough screening. Screening for abuse history and depression already are standard of care (Jones & Horan, 2002), so adding trauma and posttraumatic sequelae to existing screening could be feasible. It would be premature to suggest from this study's findings that distinct symptom-based sub-groups could or should be identified through screening: such recommendations would require replication and cross-validation of this study's findings with similar and also different (e.g., lower risk, more affluent) perinatal samples, and external validation research showing that replicable sub-groups have distinct profiles of pregnancy or postpartum outcomes warranting differential care. The present study's results suggest that research efforts along these lines are empirically indicated, but cannot as yet serve as the basis for more than the general recommendation that perinatal care providers be informed about and alert to the types of posttraumatic problems identified here.

Although abuse-related maternal PTSD has been shown to be associated with lower birth weight, shorter gestation, and impaired infant health and development (Seng et al., 2001, 2011), screening is insufficient and may be problematic if empirically-based treatment for comorbid and complex PTSD is not available. If replication in other perinatal samples affirms similar case-conceptualizations, research will be needed to adapt or develop and demonstrate the efficacy of treatments for each syndromal group. Similarly, biological studies may be warranted to determine if the syndromal groups are associated with specific adverse physical outcomes that may be averted by early detection and intervention. Thus, the present study's findings suggest a line of biopsychosocial case detection and intervention research that could ultimately provide an empirical basis for clinically addressing the impact of exposure to traumatic stress on maternal postpartum mental health and bonding, obstetric outcomes, and infant development.

## Acknowledgments

Funding for this study was provided by a National Institute of Health grant (R01 NR008767, J. Seng, Principal Investigator). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Nursing Research or the National Institutes of Health. The authors wish to acknowledge the collegial contributions of Israel Liberzon and the Trauma, Stress, and Anxiety Research Group at the University of Michigan Department of Psychiatry.

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**Table 1**

## Comorbidity of Posttraumatic Stress Disorder (PTSD)

PTSD Comorbidity	N	%	Statistics	Case Overlap
<u>Major Depressive Disorder (MDD) diagnosis</u>				
PTSD without MDD	81	5.1	$\chi^2 = 66.3$ p < .001	35% PTSD + MDD cases
MDD without PTSD	150	9.5	OR = 4.7	23% MDD + PTSD cases
Both together	44	2.8	95% CI 3.1, 7.1	
<u>Generalized Anxiety Disorder (GAD) diagnosis</u>				
PTSD without GAD	107	6.8	$\chi^2 = 32.7$ p < .001	14% PTSD + GAD cases
GAD without PTSD	51	3.2	OR = 4.6	26% GAD + PTSD cases
Both together	18	1.1	95% CI 2.6, 8.2	
<u>Somatization "cases" (score &gt;2 SD above the mean)</u>				
PTSD without somatization	94	5.9	$\chi^2 = 93.9$ p < .001	25% PTSD + Somat cases
Somatization without PTSD	58	3.7	OR = 7.9	35% Somat + PTSD cases
Both together	31	2.0	95% CI 4.9, 12.9	
<u>Affect Dysregulation (Affect Dys) "cases" (score &gt;2 SD above the mean)</u>				
PTSD without Affect Dys	87	5.5	$\chi^2 = 204.9$ p < .001	30% PTSD + IPS cases
Affect Dys without PTSD	35	2.2	OR = 17.7	52% IPS + PTSD cases
Both together	38	2.4	95% CI 10.7, 29.5	
<u>Dissociation "cases" (score &gt;2 SD above the mean)</u>				
PTSD without dissociation	97	6.1	$\chi^2 = 81.8$ p < .001	22% PTSD + Dissoc cases
Dissociation without PTSD	54	3.4	OR = 7.5	34% Dissoc + PTSD cases
Both together	28	1.8	95% CI 4.5, 12.4	

Note. OR = odds ratio; CI = confidence interval.

Table 2

Proportion of Each of Six Empirically Derived Clusters Meeting Criteria for Each Psychiatric Diagnosis/Case Syndrome

Cluster Name (N)	Depression (105)	PTSD (68)	GAD (49)	Dysregulation (68)	Dissociation (62)	Somatization (43)
% of 395	26.6%	17.2%	12.4%	17.2%	15.7%	10.9%
% of Each Cluster's Members Meeting Criteria for the Diagnosis/Case Syndrome						
Depression diagnosis N=194	54.1% N=105	12.4% N=24	9.8% N=19	17.5% N=34	6.2% N=12	0
Generalized Anxiety Disorder (GAD) N=69	0	0	71.0% N=49	15.9% N=11	4.3% N=3	8.7% N=6
Posttraumatic Stress Disorder (PTSD) N =125	0	48.8% N=61	7.2% N=9	30.4% N=38	13.3% N=17	0
Dissociation case N =82	0	0	6.1% N=5	18.3% N=15	75.6% N=62	0
Affect Dysregulation case N =73	0	0	1.4% N=1	93.2% N=68	0	5.5% N=4
Somatization case N =89	0	18.0% N=16	2.2% N=2	20.2% N=18	11.2% N=10	48.3% N=43

**Table 3**  
Associations of Trauma Exposure History and PTSD Symptoms with Empirically-derived Cluster Membership

	Depression-only N = 105	Comorbid PTSD N = 68	GAD N = 49	Affect/Relation Dysregulation N = 68	Dissociation N = 62	Somatization N = 43	Healthy N = 1,186
	Step 1						
Sociodemographic risk		1.3 (1.1, 1.5)	.79 (.66, .95)	1.4 (1.2, 1.7)	1.2 (1.0, 1.4)		.85 (.80, .91)
Non-interpersonal trauma	1.1 (1.1, 1.2)	1.1 (1.0, 1.3)		1.2 (1.1, 1.4)	1.2 (1.1, 1.3)		.81 (.77, .86)
Adulthood abuse						2.3 (1.2, 4.8)	.58 (.42, .79)
Foster/adoptive placement			2.9 (1.1, 7.6)				1.8 (1.0, 3.3)
Emotional/relational trauma				2.5 (1.1, 5.8)			
Childhood physical abuse				2.3 (1.2, 4.4)			.48 (.32, .72)
Childhood sexual abuse		2.4 (1.3, 4.4)					
Step 1 Nagelkerke R <sup>2</sup>	.02	.15	.04	.24	.07	.04	.21
Step 1 model significance	p=.045	p<.001	p=.019	p<.001	p<.001	p=.045	p<.001
	Step 2						
Sociodemographic risk			.65 (.52, .81)	1.2 (1.0, 1.5)			
Non-interpersonal trauma						2.2 (1.1, 4.5)	
Adulthood abuse							
Foster/adoptive placement			4.0 (1.5, 11.1)				
Emotional/relational trauma							
Childhood physical abuse							.61 (.38, .98)
Childhood sexual abuse		1.9 (1.0, 3.7)					
PTSD criterion B symptoms		1.4 (1.1, 1.7)		1.6 (1.2, 2.0)			.58 (.49, .69)
PTSD criterion C symptoms	1.3 (1.2, 1.5)	1.4 (1.2, 1.7)	1.5 (1.2, 1.8)	1.5 (1.2, 1.9)	1.3 (1.1, 1.5)		.65 (.59, .71)
PTSD criterion D symptoms		1.8 (1.4, 2.2)	1.5 (1.1, 2.1)				.71 (.61, .83)
PTSD psychogenic amnesia				2.3 (1.2, 4.4)			
Step 2 Nagelkerke R <sup>2</sup>	.05	.35	.15	.42	.12	.05	.44
Step 2 Model significance	p=.001	p<.001	p=.001	p<.001	p<.001	p=.138	p<.001

Note. PTSD = posttraumatic stress disorder; GAD = generalized anxiety disorder; Odds Ratios (OR) and 95% Confidence Intervals (CI) that are statistically significant,  $p < .05$ , are reported: OR (95% CI); PTSD criterion C symptoms do not include psychogenic amnesia, which is treated as a separate variable.