Prevalence, Trauma History, and Risk for Posttraumatic Stress Disorder Among Nulliparous Women in Maternity Care

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OBJECTIVE: To estimate prevalence and assess the association of types of trauma with posttraumatic stress disorder (PTSD) in a sociodemographically and racially mixed sample of women from both predominantly Medicaid and privately insured settings who are expecting their first infant.

METHODS: Structured telephone diagnostic interview data were analyzed for prevalence of trauma exposure, PTSD, comorbidity, risk behaviors, and treatment-seeking among 1,581 diverse English-speaking nulliparous women.

RESULTS: The overall rate of lifetime PTSD was 20.2%, 17% in the predominantly private-payer settings, and 24% in the predominantly public-payer settings. The overall rate of current PTSD was 7.9%, 2.7% in the predominantly private-payer settings and 13.9% in the predominantly public-payer settings. Those with current PTSD were more likely to be African American, pregnant as a teen, living in poverty, with high school education or less, and living in higher-crime areas. Adjusted odds of having current PTSD were highest among those whose worst trauma exposure was abuse (odds ratio 11.9, 95% confidence interval 3.6–39.9), followed by reproductive trauma (odds ratio 6.1, 95% confidence interval 1.5–24.4). Health risk behaviors and exposures were concentrated among those with PTSD.

CONCLUSION: These findings affirm that PTSD affects pregnant women. Women with PTSD in pregnancy were more likely to have had exposures to childhood abuse and prior traumatic reproductive event, to have cumulative sociodemographic risk factors, comorbid depression and anxiety, and to have sought mental health treatment in the past. Obstetric risk behaviors occur more in women with PTSD.
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LEVEL OF EVIDENCE: II

Posttraumatic stress disorder (PTSD) has been thought of as a condition affecting men and associated with the trauma of combat. Over the past two decades our understanding has expanded to where we now know that women are affected by PTSD as well. In fact, they are at twice the risk for developing PTSD as a consequence of trauma exposure.[1] According to the landmark National Women's Study reported in 1993, the rate of women having PTSD in their lifetime is 12.3%–an estimated 11.8 million women–and at any one point in time, 4.6% of women meet diagnostic criteria for PTSD.[2] PTSD is a syndrome (Box 1).[3] It affects both psychological and physical health by dysregulating multiple stress response systems.[4] Its adverse effects on women's health have been documented.[5] Despite the higher prevalence of PTSD in women compared with men, the effects on childbearing outcomes have not yet been well-studied.

Posttraumatic stress disorder during pregnancy has been associated with risk behaviors,[6] physical complications for the mother,[7] lower birth weight,[8]

BOX 1. POSTTRAUMATIC STRESS DISORDER DIAGNOSTIC CRITERIA PER THE DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS, 4TH EDITION.

Criterion A: The person has been exposed to a traumatic event

1. that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others

2. and the person's response involved intense fear, helplessness, or horror.

Criterion B: The traumatic event is persistently re-experienced via intrusive memories, dreams, or flashbacks, with intense psychological or physiologic distress at cues that symbolize or resemble an aspect of the event (1 of 5 listed symptoms).

Criterion C: Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (3 of 7 listed symptoms).

Criterion D: Persistent symptoms of increased arousal and hypervigilance (2 of 5 listed symptoms).

Criterion E: Duration of the disturbance (symptoms in Criteria B, C, and D) is more than 1 month.

Criterion F: The disturbance causes clinically significant distress or impairment.

shorter gestation,[9] and adverse neonatal and neurodevelopmental child outcomes.[10,11] To date, investigations of the prevalence rate of PTSD among pregnant U.S. women primarily have been focused on low-income, inner-city women, limiting generalizability. Clinical literature over the past 15 years has suggested that women with histories of child sexual abuse may be most symptomatic with PTSD due to the psychosexual nature of pregnancy, potential intrusive procedures of prenatal care, and the dynamics of relationships with health care providers.[12,13] Yet there are no studies presenting relative risk for PTSD in pregnancy in relation to specific antecedent trauma exposures. Identification of relative risk factors for PTSD in pregnancy by maternity care providers could aid in reducing negative health consequences associated with PTSD. In-depth understanding of when PTSD is most likely to be activated and knowledge of potentially mediating factors (biologic, behavioral, and interpersonal) influencing adverse outcomes for mothers and their infants is currently limited. The purpose of this study was to estimate the prevalence of having a history of PTSD thus far in the patient's lifetime, and the prevalence of having PTSD during the current pregnancy. We also examined rates of PTSD-associated comorbid conditions, substance use, and mental health treatment use among socioeconomically and racially diverse English-speaking women in prenatal care who were expecting a first infant.

MATERIALS AND METHODS

Data presented are from the first prenatal survey in a longitudinal outcomes study, "Psychobiology of PTSD & Adverse Outcomes of Child bearing" (NIH NR008767; common name "the STACY project"). It is a prospective three-cohort study with a nested case–control analysis of obstetric outcomes. It combines data from three standardized telephone interviews, medical records, salivary cortisol samples, and microarray genotyping. Participants were recruited to the study from eight maternity clinics at three health systems in the Midwestern United States, one serving predominantly privately insured patients in a small university city and two serving predominantly Medicaid recipients in an urban center. Approval for this study was granted by the institutional review boards of the three health systems. Eligible participants were English-speaking adults, aged 18 years or older, expecting a first infant, and less than 28 weeks of gestation.

All women who met eligibility criteria from August 2005 through May 2008 were invited to participate in a survey about "stressful things that happen to women, emotions, and pregnancy." Participants were identified by obstetric nurses at initiation of prenatal care. Interested women (n=2,689) were given a written information document. Logs were maintained of those eligible, not eligible, those interested, and those who declined (Fig. 1). Analysis of missed opportunities was conducted comparing log sheets with clinic appointment schedules. There were more missed opportunities in sites where intake was distributed across the entire nursing staff as opposed to clinics with a single intake nurse, and were thus deemed random and attributable to the heavier workload of the nurses on busier clinic days.

Follow-up contact was done by a survey research organization (DataStat, Inc., Ann Arbor, MI). A cadre of 13 diverse women experienced with mental health diagnostic telephone surveys conducted the interviews. Ten percent of interviews were monitored live by a
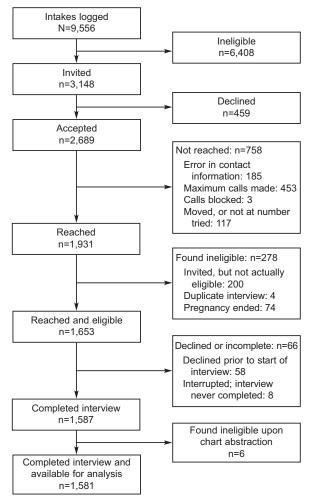
Fig. 1. Sample recruitment and enrollment.

Seng. Prenatal Posttraumatic Stress. Obstet Gynecol 2009.

supervisor across the study, evaluating quality of the verbal interaction and accuracy of entering responses. Interviewers were never able to reach 758 of the interested women, and another 278 were not actually eligible when the interviewer verified age and parity (Fig. 1). Thus, 1,653 were reached and eligible. At the start of the interview 58 declined. Another eight interviews were interrupted and not completed. Thus, 96% of those reached and apparently eligible (n=1,587) completed interviews. Of the 1,587 completed, six were eventually excluded from this analysis (n=1,581) due to ineligibility discovered upon chart abstraction. Participants were paid $20 for the initial interview.

Several instruments were used for this analysis, including assessment of lifetime trauma and violence exposure, past and current PTSD symptoms and diagnoses, depression and generalized anxiety diagnoses, substance use, and mental health treatment

history. The mean time for interview completion was 32 minutes. Algorithmic scoring by DataStat's computer-aided telephone interview program differentiated four cohorts: 1) PTSD-positive, defined as trauma-exposed and meeting criteria for PTSD diagnosis at some point in their lifetime to date; 2) trauma-positive, defined as trauma-exposed, but a negative history of PTSD; 3) nonexposed, defined as neither trauma-exposed nor PTSD-diagnosed; and 4) partial PTSD, characterized as primarily women with trauma exposures or a history of PTSD symptoms but who did not meet diagnostic criteria for PTSD (refer to Box 1).[3] We further divided the PTSD-positive cohort to distinguish those with current PTSD from those who had a history of PTSD, but not current PTSD. We used 29 relevant items from the Life Stressor Checklist to assess trauma exposure. To be considered "trauma-exposed," the participant had to either meet the diagnostic criterion of feeling "intense fear, helplessness, or horror"[3] *or* they had to have disclosed a history of childhood maltreatment. The Life Stressor Checklist asks about details of the two worst events. It is considered to have high sensitivity to trauma among women.[14] Test–retest reliability has been reported in one study that used a revised and adapted version with 186 participants over a 7-day interval. Percent agreement ranged from a low of 79% for illness to 98% for miscarriage.[14] We followed disclosure of adult abuse with items from the Abuse Assessment Screen, a measure specific to violence during pregnancy.[15] We used the National Women's Study PTSD Module to assess PTSD. The National Women's Study PTDS Module attained a sensitivity of 0.99 and specificity of 0.79 in comparison with face-to-face, clinician-administered Structured Clinical Interview for DSM-III-R.[2,16] It measures all 17 symptoms of PTSD for past and current diagnoses, and assesses distress and impairment. Comorbid depression and anxiety were assessed using the Composite International Diagnostic Interview short form, a structured psychiatric diagnostic tool designed to be used by trained interviewers who are not clinicians. It is supported by extensive field trial data on cross-national reliability and validity.[17] The Perinatal Risk Assessment Monitoring Survey, an epidemiologic surveillance instrument created by the Centers for Disease Control and Prevention, was used for assessing income, education, race/ethnic identity, and health risk behaviors, including quantitative assessment of substance use during pregnancy.[18] Crime exposure is a demographic risk factor for PTSD. This risk factor was characterized by the total crime index from the most recent (2000) Federal Bureau of Inves-

tigation uniform crime report for each participating woman's ZIP code using Simply Maps (simplymaps.com, retrieved May 20, 2009). We dichotomized this to higher or lower crime area residence based on her index number's relation to the U.S. average crime rate.[19] Mental health treatment was queried with items about therapy and medications before pregnancy.

We compared demographic, trauma history, and posttraumatic stress-related psychiatric characteristics in univariable tests across five mutually exclusive cohorts: nonexposed, trauma-exposed, but PTSD-negative, partial PTSD, past PTSD, and current PTSD. We also considered which characteristics of trauma history were most strongly associated with current symptoms. Then we estimated a three-block logistic regression model of risk factors associated with PTSD diagnosis in pregnancy.[20] First the categorical variable for worst trauma exposure type was entered followed by the variable for cumulative sociodemographic risk factors. Finally other factors which could aide in identifying PTSD-affected women were entered: comorbid depression or anxiety and prepregnancy mental health service use.

Analyses were conducted using statistical software package SPSS 16.0 (SPSS Inc., Chicago, IL).

RESULTS

Demographic comparisons across cohorts are shown in Table 1. Overall, there were 1,581 participants in the initial prenatal survey. No participants were excluded, because there were no missing data on any of the variables used in this analysis. To assure power after potential expected attrition for race-specific outcome modeling, we oversampled African-American women, achieving 45% participation. Other minority women included Latinas (4.2%), Asians (7.1%), Native American/Alaska Natives (1.5%), Native Hawaiian/Pacific Islanders (0.4%), and others (3.2%). Table 1 shows a consistent pattern: those with current PTSD are, without exception, the youngest and latest to prenatal care. They are most likely to have socioeconomic risk factors associated with stress and PTSD: being African American, a teen, living in poverty, with high school education or less, and living in a higher-than-average crime area. They also carry the most cumulative sociodemographic risk (mean 3.1). The cohort who were trauma-exposed

Table 1. Demographic Profile Showing Relationship of Demographics, Trauma Exposure, and Posttraumatic Stress Disorder Morbidity

Total	Nonexposed 22.1% n=350	Trauma Exposed 24.0% n=380	Partial PTSD 33.6% n=532	Lifetime PTSD 12.3% n=194	Current PTSD 7.9% n=125	Statistic	P
Individual factors in risk index							
African American*	42 (147)	33.4 (127)	49.8 (265)	39.2 (76)	75.2 (94)	$\chi^2=75.6$	<.001
Teen	24.3 (85)	15.3 (58)	28.4 (151)	18.6 (36)	37.6 (47)	$\chi^2=37.5$	<.001
Poverty	18.9 (66)	17.4 (66)	23.5 (125)	22.7 (44)	44.8 (56)	$\chi^2=44.2$	<.001
Secondary education or less	46.6 (163)	33.9 (129)	49.6 (264)	40.7 (79)	76.8 (96)	$\chi^2=74.9$	<.001
More than U.S. average crime rate	40.6 (142)	29.2 (111)	45.5 (242)	34.0 (66)	67.2 (84)	$\chi^2=65.7$	<.001
Cumulative risk factors (n)†						$\chi^2=128.2$	<.001
0	22.6 (148)	31.6 (207)	30.7 (201)	13.6 (89)	1.5 (10)		
1	26.1 (42)	23.6 (38)	32.9 (53)	12.4 (20)	5.0 (8)		
2	15.4 (20)	23.1 (30)	30.0 (39)	19.2 (25)	12.3 (16)		
3	25.1 (49)	16.9 (33)	32.8 (64)	10.3 (20)	14.9 (29)		
4	20.7 (62)	15.7 (47)	42.0 (126)	7.7 (23)	14.0 (42)		
5	20.7 (29)	17.9 (25)	35.0 (49)	12.1 (17)	14.3 (20)		
Mean no. of risk factors	1.8 (±1.8)	1.3 (±1.7)	2.0 (±1.9)	1.6 (±1.8)	3.1 (±1.4)	F=26.7	<.001
Other descriptors							
Age at interview (y)	25.59 (±5.6)	27.46 (±5.7)	25.54 (±6.0)	27.20 (±6.2)	22.92 (±4.7)	F=18.4	<.001
Gestational age at interview	14.26 (±5.9)	13.11 (±5.1)	14.50 (±7.2)	14.01 (±7.0)	15.88 (±6.8)	F=−5.3	<.001
Sites						$\chi^2=94.8$	<.001
Small city prenatal clinics	22.3 (189)	29.4 (250)	31.2 (265)	14.4 (122)	2.7 (23)		
Urban prenatal clinics	22.0 (130)	17.8 (130)	36.5 (267)	9.8 (72)	13.9 (102)		

PTSD, posttraumatic stress disorder.
Data are % (n) or mean (±standard deviation).
* Analyses in this study focus on African American (44.8%, n=709) and European Americans (45.9%, n=725). Other racial and ethnic identities, including Latina (4.2%, n=67), Asian (7.1%, n=113), Other (3.2%, n=51), Middle Eastern (2.3%, n=36), American Indian or Alaska Native (1.5%, n=23), Native Hawaiian or Pacific Islander (0.4%, n=7) did not differ significantly in their risk for PTSD.
† This is a cumulative index computed as the sum of five individual risk factors for posttraumatic stress disorder: being African American, a teen, living in poverty, having less than or equal to high school education, and residence in a high crime area.

Table 2. Trauma Profile and Prior Treatment

	Nonexposed 22.1% n=350	Trauma Exposed 24.0% n=380	Partial PTSD 33.6% n=532	Lifetime PTSD 12.3% n=194	Current PTSD 7.9% n=125	Statistic	P
Sum of traumas	1.8 (±1.9)	4.0 (±2.2)	5.0 (±2.9)	7.5 (±3.7)	9.1 (±4.4)	F=216.222	<.001
Age period at worst exposure						χ^2=283.9	<.001
Both in childhood	23.7 (83)	27.6 (105)	24.1 (128)	25.3 (49)	31.2 (39)		
One event each period	16.9 (59)	37.9 (144)	38.0 (202)	39.2 (76)	37.6 (47)		
Both in adulthood	34.6 (121)	34.5 (131)	35.3 (188)	35.6 (69)	31.2 (39)		
No worst trauma	24.9 (87)*	0†	2.6 (14)	0†	0†		
Worst trauma was "extremely troubling"	33.1 (87)	64.2 (244)	63.7 (330)	74.2 (144)	77.6 (97)	χ^2=141.6	<.001
Worst trauma affected life in past year	3.4 (9)	4.2 (16)	10.8 (56)	19.6 (38)	36.8 (46)	χ^2=218.4	<.001
Prior mental health treatment	13.7 (48)	28.2 (107)	34.4 (183)	60.8 (118)	41.6 (52)	χ^2=136.8	<.001

PTSD, posttraumatic stress disorder.

Data are % (n) or mean (±standard deviation).

* The "nonexposed" cohort includes women who reported a trauma occurred but 1) they did not experience "fear, helplessness, or horror" per the Diagnostic and Statistical Manual of Mental Disorders, 4th edition criterion A2 or 2) their trauma was not childhood abuse.

† These cohorts definitions included trauma exposure that 1) met the Diagnostic and Statistical Manual of Mental Disorders, 4th edition criterion A2 or 2) was childhood abuse (regardless of the A2 criterion).

but PTSD-negative has the fewest sociodemographic risk factors (mean 1.3).

Participants with current PTSD had the greatest mean number of trauma exposures (mean 9.1; Table 2). Both PTSD-diagnosed groups described their worst traumatic event as "extremely troubling" at the time (74% past, 78% current PTSD). However, the group currently meeting diagnostic criteria was significantly more likely to rate the past year effect on them as "extremely troubling" (37% compared with 20%). The current PTSD group was also significantly more likely to have experienced both of their two worst trauma exposures before the age of 16.

Types of trauma exposures were grouped into five categories: family context (eg, not having enough money for food, family member jailed, having been fostered or adopted), event (eg, being in an accident, disaster, or war zone), reproductive, characterized as "having a difficult time because of an abortion or miscarriage" in this sample of nulliparous women, abuse (sexual, physical, emotional, or neglect), and "other," usually left unspecified. The odds of having any one of these types of trauma was higher across all 29 items for the group with current PTSD. Univariable odds ratios (ORs) approached one for common exposures (ie, death of a loved one, OR 1.3, 95% confidence interval [CI] 0.9–1.8), but were higher for exposures that are more related to pregnancy, such as "having a difficult time because of an abortion or miscarriage" (OR 3.6, 95% CI 2.4–5.4), or more psychosexual in nature, such as childhood completed rape (OR 5.3, 95% CI 3.2–8.7), and childhood physical abuse (OR 6.6, 95% CI 4.3–9.8), emotional abuse

(OR 10.2, 95% CI 6.9–10.0), and physical neglect (OR 10.3, 95% CI 6.0–17.5).

Overall, 20.2% of the sample had met diagnostic criteria for PTSD in their lifetime. The rates varied by site. In the predominantly private-payer settings the rate was 17.1%, and in the predominantly public-payer settings the rate was 23.8%. Of the 318 women who had met PTSD diagnostic criteria in the past, 125 met diagnostic criteria at the time of the initial interview, making the prevalence of current PTSD 7.9% (95% CI 6.6–9.3%) in this study. The site-specific rates differed by setting; the current PTSD rate was 2.7% in the predominantly private-payer setting and 13.9% in the predominantly public-payer setting. Nonexposed and trauma-exposed but PTSD-negative women reported less than one PTSD symptom. Women with past PTSD reported a mean of 3.6 symptoms at the time of the interview. The currently diagnosed group had a mean of 10 symptoms. Six are required to meet diagnostic criteria, suggesting this group was highly symptomatic.

Some traumatized individuals may turn to substance use as a way to manage their symptoms of PTSD.[21] Pregnancy cigarette and illicit drug use occurred in a dose–response pattern with PTSD severity. Alcohol use also followed this trend, but use of "any" alcohol (defined as one drink or more per week) was not significantly different across the groups.

Women experiencing intimate partner violence are concentrated (86%) in the PTSD-affected groups. Fifty-two percent of past year incidence of intimate partner violence occurred in the PTSD-diagnosed groups. Another 34% of intimate partner violence cases occurred among those with partial PTSD.

Major depressive disorder was rare among women who did not have PTSD. The rate of major depressive disorder diagnosis in the overall sample was 12.3%, consistent with other perinatal studies.[22] Among women without PTSD, rates were low (3.4% among nonexposed, 4.7% among trauma-exposed but PTSD-negative). However, the rates of major depressive disorder in the past and current PTSD groups were 27% and 35%, respectively. Thus, 84.5% of prenatal depression cases were comorbid with full or partial PTSD; 50% were in the PTSD-diagnosed categories, and another 34.5% were in the group with partial PTSD. Generalized anxiety disorder occurred in this pattern as well, from 0.3% (nonexposed) to 14.4% (current PTSD).

Current PTSD was associated with reporting impairment and distress, 41.2% in school and work, 76.5% in family functioning, with 52.9% considering their symptoms very distressing. Only three women with current PTSD reported minimal distress or impairment.

Those whose PTSD had remitted (ie, past cases), had higher rates of mental health treatment than current cases. Compared with the nonexposed cohort's use of mental health services (13.7%), the trauma-exposed but PTSD-negative cohort had used treatment twice as much (28.2%), those with current PTSD three times as much (41.6%), and those whose PTSD had remitted were four times as likely to have used treatment (60.8%; $\chi^2=136.8$, df=4, $P<.001$).

We considered the question of which factors increased risk for meeting diagnostic criteria for PTSD in early pregnancy by a logistic regression model (Table 3). The first block of the logistic regression model focused on the association of a mutually exclusive six-category trauma history variable to answer the research question, "Which *worst* trauma exposures are predictive of PTSD diagnosis during early pregnancy?" The reference category is the sixth category of women who reported no trauma, or who reported an exposure, but who declined to state any trauma was "worst" because they did not consider any trauma very severe. The amount of variance explained in this logistic regression model per Nagelkerke R squared[20] was 9.9%. The most predictive category in this unadjusted block was abuse (OR 24.5, 95% CI 7.5–80.0), followed by "having a difficult time due to an abortion or miscarriage" (OR 11.9, 95% CI 3.1–46.3). The second block added the cumulative sociodemographic risk factor variable. This factor increased the amount of variance explained to 16.6%. Each accumulated risk increased odds of PTSD diagnosis during pregnancy by 40%

Table 3. Step-Wise Logistic Regression Model of Risk Factors for Meeting Diagnostic Criteria for Current Posttraumatic Stress Disorder During Pregnancy Including Worst Antecedent Trauma, Cumulative Socioeconomic Status Risk Factors, Previous Mental Health Treatment, and Comorbidity (N=1,581)

	P	Exp (B)	95.0% CI for EXP (B) Lower	95.0% CI for EXP (B) Upper
Block 1*				
Worst trauma type	.000			
Family context	.001	6.929	2.148	22.354
Events	.007	5.977	1.644	21.725
Reproductive	.000	11.937	3.080	46.262
Abuse	.000	24.544	7.527	80.039
Other	.018	7.231	1.410	37.088
Constant	.000	.011		
Block 2†				
Worst trauma type	.000			
Family context	.008	4.930	1.516	16.029
Events	.020	4.661	1.271	17.092
Reproductive	.001	9.357	2.385	36.702
Abuse	.000	17.789	5.408	58.514
Other	.010	8.637	1.661	44.920
Cumulative SES risk factors	.000	1.445	1.294	1.613
Constant	.000	.006		
Block 3‡				
Worst trauma type	.000			
Family context	.028	3.804	1.155	12.524
Events	.084	3.214	.856	12.063
Reproductive	.011	6.059	1.504	24.409
Abuse	.000	11.904	3.555	39.858
Other	.032	6.376	1.178	34.516
Cumulative SES risk factors	.000	1.549	1.369	1.752
Previous therapy or medication	.013	1.776	1.131	2.787
Depression diagnosis	.000	3.139	2.010	4.903
Generalized anxiety diagnosis	.001	3.025	1.558	5.872
Constant	.000	.004		

CI, confidence interval; EXP (B), estimate of the odds ratio; SES, socioeconomic status.

Worst trauma type is a categorical variable with no worst trauma as the reference category.

* Model $\chi^2=68.259$, df=5, $P<.001$; Nagelkerke R square=.099.

† Model $\chi^2=115.376$, df=6, $P<.001$; Block $\chi^2=47.125$, df=1, $P<.001$; Nagelkerke R square=.166.

‡ Model $\chi^2=167.103$, df=9, $P<.001$; Block $\chi^2=51.728$, df=3, $P<.001$; Nagelkerke R square=.236.

(OR 1.4, 95% CI 1.3–1.6). In the third block, we entered additional factors that could be identified within a clinical interview (ie, use of mental health services) or by screening (ie, depression and anxiety). These variables were significantly associated with

current PTSD diagnosis and increased the variance explained by the overall model to 23.6%.

DISCUSSION

The prevalence rates of lifetime and current PTSD in this study are higher than the 12.3% lifetime and 4.6% current prevalence rates within the U.S. general population of women found using the same measure in the largest epidemiologic study of U.S. women to date.[2] The trauma exposures that most increase risk of meeting PTSD diagnostic criteria during pregnancy are a history of childhood maltreatment, followed by a previous miscarriage or abortion that the woman experienced as traumatic. Although trauma and PTSD occurred across the socioeconomic continuum, women in the urban, predominantly public-payer sites had more cumulative trauma exposures and were less likely to have recovered from PTSD (23%). Health risk behaviors associated with poor obstetric outcomes were concentrated among the PTSD-affected women, including substance use, intimate partner violence, and late prenatal care. Depression also was concentrated in the PTSD-affected groups, with 84.5% of major depressive disorder cases co-occurring with partial, lifetime, or current PTSD. A longitudinal study conducted in the same urban center verified that major depressive disorder onset most frequently occurs after PTSD onset.[23] Additionally, 76.5% of women with PTSD reported impairment in family functioning. This raises concerns about the extent to which PTSD-affected women may lack instrumental and emotional social support as they start to fulfill the mothering role in the potentially stressful postpartum period.

There are several limitations of this study. First, although we used standardized, previously validated epidemiologic measures,[2,17] we did not repeat validation for our investigation. Second, we were not able to compare this sample with those who were eligible but were missed in recruitment, those who were not reached after expressing interest, or who declined. Sensitivity analysis[24] indicates that if all those who declined were PTSD-positive, the upper limit of point prevalence would have been 39.0%. If they had been PTSD-negative, the lower limit of point prevalence would have been 5.2%. Thus, our 7.9% prevalence estimate, which has a 95% CI of 6.6–9.3%, is reasonably conservative. Also, it is a limitation that the urban and small city sites were different in terms of their relative proportion of publicly and privately insured patients. This situation occurs in many U.S. locations, and the findings for the respective sites can inform clinical care tailored to the needs of diverse clinical services. Finally, the results presented here are from first wave of data collection and so are cross-sectional in nature, limiting our knowledge of the temporal order of onset of comorbidities.

There are strengths in our investigation also. The use of the National Women's Study PTSD module for diagnosis allows comparison with a nationally representative epidemiologic study. The sample is large, racially, economically and geographically diverse, addressing a limitation to generalizability in previous prevalence studies that focused on primarily low-income samples. Use of standardized telephone interviews conducted outside the clinical setting avoids the potential biases in clinician judgments and potential hesitancy of participants to disclose sensitive information that could enter their record and affect their clinical care. The ability to compare PTSD-affected women with both trauma-exposed and nonexposed controls is a useful design for distinguishing which associations are related to trauma generally and which are specific to PTSD.

These findings suggest a need to extend screening beyond abuse history and depression to include posttraumatic stress disorder. Use of mental health services in the past was associated with having recovered from PTSD. Women with current PTSD had used less treatment before pregnancy. Treatment may have facilitated recovery or prevented development of the full syndrome, but it is not possible to verify this with the cross-sectional nature of this analysis. Screening for those meeting current diagnostic criteria for PTSD and referring for therapy is warranted. Using the Cochrane review of the evidence base for PTSD treatment[25] the number needed to treat profile for remission of PTSD by psychotherapy (number needed to treat=3) or medication (number needed to treat=5) generally is favorable. We estimated a number needed to screen (calculated as number needed to treat/prevalence of untreated disease[26]). Of the 125 women with PTSD in pregnancy, 16 were currently in psychotherapy or using medication, so the untreated prevalence is 7% of the sample of 1,581. Using psychotherapy as the frontline treatment during pregnancy, the number needed to screen (3/.07) is 43. Thus, 43 women would need to be screened to have one case treated with psychotherapy remit. Primary care screening tools are available at www.ncptsd.va.gov/assessment/screening ranging from 4 to 17 items, similar to tools commonly used to screen for perinatal depression. This number needed to screen estimate is conservative because we do not know if the treated women in our sample were accurately diagnosed or if

they were receiving an evidence-based treatment for PTSD.

There already are numerous studies and reviews estimating the significant adverse effects of abuse trauma and PTSD on lifespan health.[27] Our results indicate that 3% to 14% have current PTSD as they enter into prenatal care. This group also is most at risk for adverse perinatal health behaviors. Our results show that many cases of depression likely are secondary to PTSD and would be more effectively addressed as a complication of the unidentified or untreated, underlying PTSD. This means that PTSD may be a unifying construct linking perinatal health risk behaviors and depression. Thus trauma-informed interventions may be more effective than separately applied substance use, primary depression, and domestic violence interventions applied without consideration of the traumatic stress causation.[25]

Outcomes research is needed to comprehensively estimate the effects of PTSD on obstetric and neonatal health outcomes, as well as postpartum mental health and attachment outcomes for affected pregnant women. A broad range of evidence-based interventions for PTSD are in use in mental health settings for general populations, including psychoeducation, group and individual psychotherapies, medications,[28] and companion recovery models.[29] Translating these interventions to meet the particular needs of childbearing women is an area for future study. Existing maternity care programs for at-risk women, such as group prenatal care and doula services might be enriched to provide trauma-informed support. As the health implications of PTSD for childbearing women become more defined, the development of trauma-informed mental health screening, psychosocial support programs, and PTSD-specific referral resources may represent new avenues for improving perinatal outcomes.

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