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Relationship of trauma history and premenstrual syndrome among female veterans

Brittany Catherine McKinnon
University of Iowa

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RELATIONSHIP OF TRAUMA HISTORY AND PREMENSTRUAL SYNDROME
AMONG FEMALE VETERANS

by
Brittany Catherine McKinnon

A thesis submitted in partial fulfillment
of the requirements for the Master of
Science degree in Epidemiology
in the Graduate College of
The University of Iowa

May 2009

Thesis Supervisor: Professor James C. Torner

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Graduate College
The University of Iowa
Iowa City, Iowa

CERTIFICATE OF APPROVAL

MASTER'S THESIS

This is to certify that the Master's thesis of

Brittany Catherine McKinnon

has been approved by the Examining Committee
for the thesis requirement for the Master of Science
degree in Epidemiology at the May 2009 graduation.

Thesis Committee: _____
James C. Torner, Thesis Supervisor

Robert B. Wallace

Susan R. Johnson

Anne G. Sadler

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ABSTRACT

Prior research has pointed to an association between a history of traumatic events and premenstrual syndrome (PMS) in women. The objective of this study was to further investigate the relationship between trauma and PMS among female veterans, a population with high rates of sexual and physical abuse, as well as combat-related exposures. We conducted a case-control study of 502 women veterans under the age of 52 who were associated with the Iowa City Veterans Affairs Medical Center. Trauma history, gynecological health, mental health (including posttraumatic stress disorder), and other variables were obtained through telephone interview. Cases were women who had moderate to severe PMS as defined by validated criteria and controls were women without PMS. The prevalence of PMS was 14.3%. Thirty three percent of subjects reported a completed sexual assault, 29% a combat-related trauma, and 86% a non-combat related trauma. Factors significantly associated with PMS ($p < 0.05$) in the univariate analysis were: attempted, completed, and number of rapes during a woman's lifetime; rape before age 18; rape during military service; childhood sexual abuse; and number of non-combat related traumas. Childhood physical abuse and combat-related trauma were not associated with PMS in univariate analyses. In our final multivariate model, lifetime completed sexual assault was associated with PMS (odds ratio = 2.42, 95% confidence interval = 1.33-4.40). Findings from this study among female veterans indicate that a history of trauma, particularly sexual trauma, is associated with moderate to severe PMS. Further study is warranted to confirm temporal relationships and causal mechanisms.

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INTRODUCTION

Women are subjected to traumatic experiences at alarming rates during childhood and adulthood, with particularly high risks of physical and sexual violence throughout their lifetimes compared to men. The scope of the adverse effects of traumatic experiences on psychological, physical, and social well-being are only beginning to be fully recognized and understood.¹ There is strong evidence that women with a history of physical and sexual trauma experience higher rates of psychological problems, including post-traumatic stress disorder (PTSD), depression, anxiety, and substance use disorders²⁻⁴ as well as physical problems like pelvic pain, headaches, obesity, diabetes, and heart attacks.⁵⁻⁷ Recently, a number of studies have suggested an association between a history of traumatic events and premenstrual syndrome (PMS).⁸⁻¹¹ While the etiology of PMS remains unknown, the disorder is extremely prevalent and causes a significant burden to individuals and society.

The goal of this study is to further investigate the association between a history of traumatic events and PMS among female military veterans, a population with high rates of sexual and physical abuse, as well as combat-related traumatic experiences. In general, we hypothesize that women who have a history of trauma will experience higher rates of PMS. We are particularly interested in investigating the magnitude of the associations between PMS and the various types of traumatic experiences we were able to measure in this study, including childhood physical and sexual abuse, attempted and completed sexual assault, military sexual trauma, combat-related trauma, and non-combat related trauma.

CHAPTER I

BACKGROUND

PMS is characterized by physical and/or emotional symptoms that occur during the week prior to menstruation and that are severe enough to impair some aspect of a woman's life. While up to 85% of reproductive-age women experience some premenstrual symptoms, only around 3-9% experience symptoms severe enough to impair daily functioning and are classified as having a clinical level of PMS.¹² Common symptoms of PMS include irritability, depressed mood, headache, bloating, fatigue, food cravings, tension, and breast swelling.¹³ Premenstrual symptoms often begin at the time of menarche, however the majority of women who seek treatment for PMS are over 30 years of age.¹⁴ One longitudinal study found that premenstrual symptoms emerge in early adulthood and increase in severity with age, although this has not been consistently observed.¹⁵

Premenstrual dysphoric disorder (PMDD) is a psychiatric diagnosis included in the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) that has been explored in a number of clinical studies. As PMDD appears later in this chapter in reviewing the literature, it is useful to mention that PMDD is a severe form of PMS with the presence of at least one mood symptom.¹⁶ Studies have shown that the burden of severe PMS/PMDD on health related quality of life (HRQoL) is greater than that of chronic back pain, similar to that of dysthymic disorder and osteoarthritis, and only slightly lower than that of major depressive disorder.^{12,17,18}

The etiology of PMS is unknown, and may be multifactorial and complex.¹⁹ A number of biological theories have been proposed for PMS, including involvement of reproductive hormones, genetics, and serotonin, with the serotonin system being the most likely and most studied.²⁰ It is thought that ovulation triggers a reduction in the neurotransmitter serotonin through a pathway that is not yet understood.¹⁶ Further

evidence for the role of serotonin comes from the fact that PMS is often successfully treated with SSRIs (selective serotonin reuptake inhibitors).

Several risk factors for PMS/PMDD have been suggested in the literature, including smoking^{21,22}, mood disorders^{21,23-25}, anxiety disorders^{9,21,23,25}, overweight or obesity^{21,22,26}, a history of sexual abuse^{8,9} and perceived stress.^{27,28} However, many of the studies examining risk factors for PMS/PMDD have been cross-sectional surveys, often conducted among small samples in clinical settings.²⁹

Trauma and PMS

A number of studies have shown that women who report a history of sexual abuse have higher rates of PMS/PMDD^{9-11,30-32} and more severe premenstrual symptomatology^{8,33} than non-abused women. Lifetime sexual assault rates of over 60% have been observed among women with PMDD.^{10,30-32} There is also evidence that women with PMS/PMDD report higher levels of stress^{8,27,28,34} than women without PMS/PMDD. Work involving neurobiological markers has shown that exposure to abuse leads to persistent and long-term dysregulation in stress-response systems, which may support a role for trauma and stress in the pathophysiology of PMDD.¹¹

Research shows that women who report childhood or adolescent abuse have lower self-esteem, more mood disorders, and more physical symptoms than women initially abused as adults.^{35,36} Unfortunately, women who were abused during childhood are also at increased risk for subsequent physical and/or sexual assault in adulthood.¹ There is also evidence that women with a history of childhood physical and/or sexual abuse have higher rates of severe PMS/PMDD than women without a history of childhood abuse. A prospective community cohort found that women with PMDD were significantly more likely to have experienced sexual abuse during childhood (unadjusted OR=6.7, 95% CI= 3.2-14.1) compared to women without PMDD.⁹ Another community

sample of 568 women aged 18-45 found that both adolescent physical and sexual abuse were significantly associated with PMS.³⁷

Most of the research on trauma and PMS/PMDD has focused on sexual trauma, thus very little is known about the relationship between non-sexual trauma and PMS. The one community-based study we are aware of found that women with PMDD were more likely to have experienced physical threat with a weapon (OR=3.3, 95% CI=1.6-6.7) and severe accidents (OR=2.3, 95% CI=1.0-5.0) than women without PMDD.

Trauma and PMS among female military veterans

Female military veterans have disproportionately higher rates of traumatic experiences than civilian women, particularly sexual assault, physical assault, and combat exposures.^{2,38} A review of trauma among female veterans found that 81-93% had experienced a traumatic event at some point in their lives, 38-64% had a history of sexual abuse in their lifetime, and 27-49% had a history of childhood sexual abuse.³⁸ In comparison, the lifetime rate of sexual abuse reported among civilian women is estimated at around 15-25%⁶ and prevalence estimates for childhood sexual abuse among women in the general population range from 15-33%.¹

There is also a high risk of both physical and sexual violence against women during military service. In studies of women seeking care from the DVA, 23-29% reported being sexual assaulted during military service.³⁹ Women who report military sexual assault (MSA) are two to three times more likely to screen positive for current depression or alcohol abuse than women without a history of MSA and nine times more likely to develop PTSD than women veterans with no history of sexual assault.^{40,41} Women with a history of MSA also report significantly more physical problems, including chronic pain, menstrual pain, and gastrointestinal symptoms than veterans without a history of MSA.⁵

Few studies have assessed the prevalence of and risk factors for PMS among female veterans. In a national sample of women veterans who had received care at a VA facility, 55% reported premenstrual symptoms severe enough to interfere with their usual activities or lifestyle.⁴² Women who reported premenstrual symptoms in this study had significantly more physical problems, worse social functioning, and more mental health problems than women who did not report premenstrual symptoms. Only one study was identified that assessed the relationship between traumatic experiences and premenstrual symptoms among female veterans. This nationally representative sample of 3632 women veterans found that women with a history of sexual assault in the military were more likely to report a history of premenstrual symptoms severe enough to interfere with usual activities or lifestyle in the past 6 months (age adjusted OR=1.8, 95% CI=1.5-2.2).⁵

Posttraumatic stress disorder

PTSD is one of the most common psychological sequelae of trauma, affecting up to 25% of individuals exposed to traumatic events.⁴³ Women are approximately twice as likely to develop PTSD following trauma than men.¹ Other risk factors for the development of PTSD include preexisting psychiatric disorders, the individual's initial reaction to the acute stress of the trauma, the type and severity of the trauma, and the individual's history of stress, abuse, or trauma.⁴³ PTSD is most often associated with rape in women; about 50% of women who are raped will develop PTSD.¹ A number of comorbidities have been associated with PTSD in women, including major depressive disorder, anxiety disorders, and alcohol and substance use problems.¹ There is also some evidence that women who have PTSD may be more likely to suffer from severe PMS/PMDD.⁹ A prospective community cohort of 1488 women age 14-24 found a strong cross-sectional association between PTSD and PMDD at baseline (OR=11.7, 3.0-46.2).⁴⁴

The lifetime prevalence of PTSD in female veterans is estimated at 27%, much higher than the 10-12% prevalence found in the general population.³⁸ In a review of six

studies that evaluated predictors of PTSD among female veterans, both war stress and sexual stress or trauma were found to be significantly predictive of PTSD.⁴⁵ This article also found that women with PTSD had poorer health status, more physical health symptoms and medical conditions, and more somatization than women without PTSD. There have been no studies to our knowledge assessing the role of PTSD as a risk factor for PMS among female veterans.

Menstrual-related problems are a significant women's health concern and there is a need for better understanding of these problems, including PMS. While there has been some research suggesting an association between trauma and PMS, a number of questions remain unanswered about this relationship. This study provides an opportunity to further investigate the relationship between trauma and PMS in a population with high rates of traumatization. An important aspect of this study is the ability to examine different types of trauma, including MSA, childhood abuse, and combat-related traumatic experiences to determine differences in their associations with PMS. In addition, with the recent evidence suggesting a possible strong association between PTSD and PMS, investigating this relationship is of much interest.

CHAPTER II

METHODS

Women Veterans Reproductive Health Study

The Women Veterans Reproductive Health Study is a cross-sectional study using a cohort of 1004 women veterans. The primary objective of this study was to assess gynecological health disorders, gynecological health risk behaviors, and gynecological health care utilization of women veterans with lifetime sexual assault exposure(s) compared to non-victimized women veterans. Potential study subjects were women veterans under the age of 52 who registered with the Iowa City Veterans Affairs Medical Center (VAMC) and outlying clinics in the preceding 5 years. An introductory letter and information summary was mailed to 2414 eligible subjects. This letter requested participation through the completion of a 60 minute computer assisted telephone interview (CATI) covering women's gynecologic health and treatment history, general medical history, a review of life events they may have experienced, and past and current health status. Women were excluded from participation in the study if they were aware of in utero diethylstilbesterol (DES) exposure or currently receiving treatment with immunosuppressants because a primary objective of the study was to assess cervical cytological outcomes. A response rate of 64.3% was calculated based on the 1082 subjects who consented to participation in the study and the 631 who refused consent. Of the 1082 subjects that consented to participation, 1004 were eligible and completed the interview.

PMS substudy

This PMS substudy further excluded women who reported having a hysterectomy or having gone through menopause, as well as women reporting a history of gynecological cancer, usually irregular menstrual cycles, a diagnosis of polycystic

ovarian syndrome, or infertility, as these may cause menstrual symptoms that are not related to PMS. Subjects who reported fewer than 4 or more than 8 periods in the past 6 months were considered to have irregular menstrual cycles. A total of 431 women were excluded from the study based on the criteria above, leaving a sample size of 573.

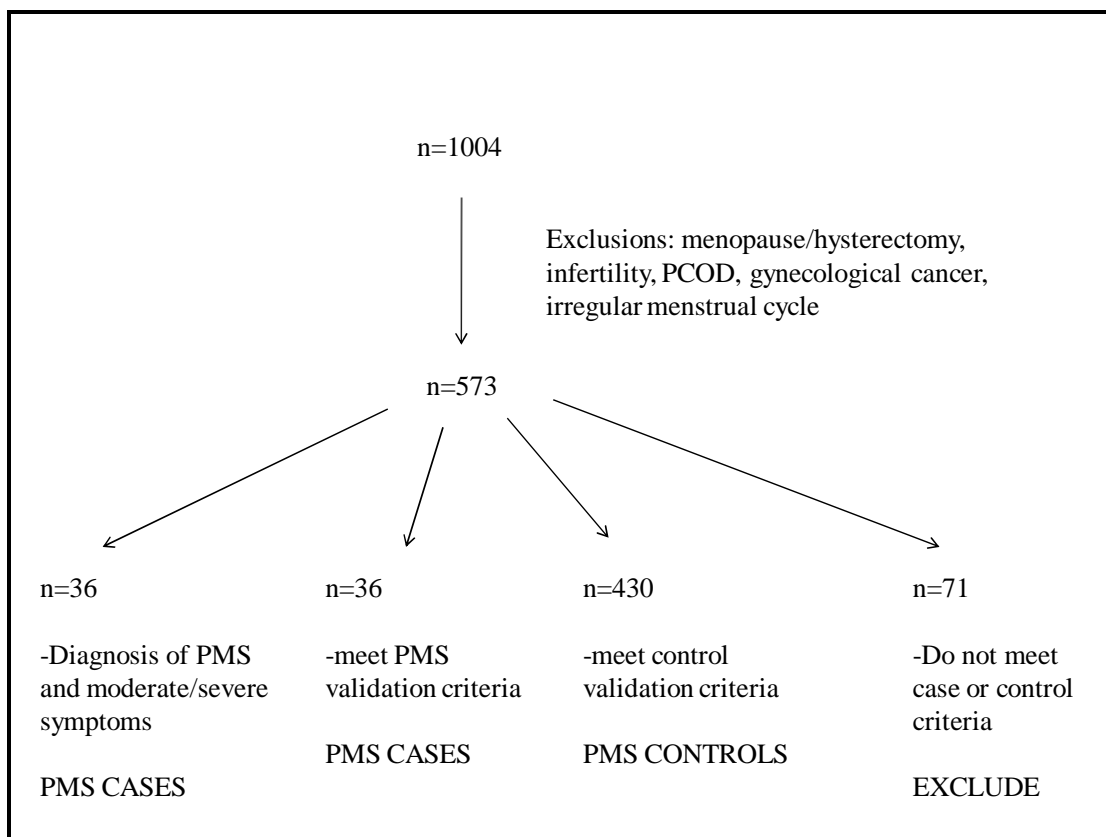
Identification of PMS cases and controls

PMS cases were identified in two ways for this study. First, women reporting having been given a diagnosis by a health care provider were considered to have PMS if they also reported moderate or severe PMS symptoms. Moderate and severe symptoms were defined as “moderate, interferes with normal activities” and “severe, intolerable, prevents normal activities.” Of the 58 women reporting a diagnosis of PMS by a health care provider, 36 reported moderate or severe PMS symptoms. The 22 women who reported mild symptoms were excluded from further analyses.

The second criterion used to identify PMS cases was based on the answers to twelve questions that were developed from the PMS questionnaire used in the Nurses’ Health Study⁴⁶ and based on the Calendar of Premenstrual Experiences designed by Mortola et al.⁴⁷ Women were asked to self-report PMS and about the severity of symptoms, the timing of onset and cessation of symptoms in the menstrual cycle, and about the effects of menstrual symptoms, including relationship discord with a spouse or partner, parenting difficulties, poor work performance or attendance, and social isolation. Based on this information, a validation criterion for the self-report of PMS was constructed, generally following the criteria used to validate self-reported PMS in the Nurses’ Health Study.²² We included women reporting a self-diagnosis of PMS along with the following criteria: moderate or severe symptoms that interfere with normal activities, symptoms beginning within 14 days of the onset of menses, symptoms ending within 4 days of the onset of menses, and the absence of symptoms in the week after menses. A total of 36 women met these criteria.

Validated controls were subjects who reported no history of PMS diagnosis and who experience no or mild PMS symptoms that have little or no effect on daily activities. In total, there were 72 PMS cases (36 with a formal PMS diagnosis and 36 with a validated self-report of PMS) and 430 validated controls. A total of 71 women did not meet the criteria to qualify as a case or control and were excluded from further analysis.

Figure 1: Flow chart of study participants



Assessment of sexual violence, trauma, and PTSD

Sexual violence exposures were assessed using the legal definition of rape, which has been adopted by the American Medical Association and is used frequently in sexual violence research.⁴⁸ This definition includes any act that occurred without a woman's consent, which involves the use of threat or force, and includes attempted or completed sexual penetration of their vagina, mouth or rectum. The questions about sexual violence exposures were based on questions from the National Violence Against Women Survey (NVAWS) and the National Women's Study (NWS).⁴⁹ Women who acknowledged a history of rape were asked about the time of their life that it occurred. We examined the following sexual assault experiences: lifetime attempted and completed rape, lifetime number of rapes, rape before age 18, and rape during military service.

Childhood or adolescent abuse was assessed using seven questions based on the Childhood Trauma Questionnaire.⁵⁰ We separately examined sexual abuse and physical abuse that occurred during childhood. Physical abuse was defined as being hit by a family member so hard that it left bruises or marks and sexual abuse was defined as being made to do or watch sexual things.

Traumatic experiences other than childhood abuse and sexual assault were also examined. Questions about non-sexual traumatic experiences came from the Diagnostic Interview Schedule (DIS-IV) subscale for PTSD. Developed in accordance with the DSM-IV, the DIS-IV has demonstrated test-test reliability and validity in a variety of settings and is one of the most widely used diagnostic interviews in psychiatric research.⁴¹ Traumatic categories normally assessed by the DIS were supplemented with exposures specific to military populations. Nine questions were used to assess traumatic experiences related to service in a military combat zone or war zone. Questions included: being held captive as a prisoner of war; being wounded; seeing someone seriously injured or killed; providing care to wounded soldiers or enemy prisoners of war; working with dead bodies; experiencing incoming artillery, mortar or scud missiles; and experiencing a

threat of chemical or biological attacks requiring wearing a gas mask. Subjects who answered yes to any of these questions were considered as having been exposed to a combat-related trauma. Other lifetime non combat-related traumatic experiences were assessed by a further eleven questions. Lifetime non-combat traumatic experiences included torture, life-threatening illnesses, non-sexual assault, and experiencing a serious accident, fire or explosion. Subjects who answered yes to any of these eleven questions were considered as having experienced a non combat-related trauma in their lifetime. As the majority of women in our study had reported exposure to a non-combat trauma, we decided to use the number of non-combat traumas experienced as our variable for this exposure.

PTSD was examined in two different ways: 1) self-report of ever having been given a diagnosis of PTSD by a health care provider and 2) current PTSD as determined by responses to the DIS-IV subscale for PTSD.

Assessment of other covariates

We also examined other factors which may be related to PMS and/or trauma. Demographic and socioeconomic variables examined included age, highest level of education, ever served on active military duty, currently employed for wages, health insurance status, and care received at the VA in the past 5 years (categorized as none, some, or all). A number of general health variables were also examined, including smoking status (never, past, current), age started smoking, body mass index (calculated from height and weight), caffeine intake, ever used illegal drugs, minutes of physical activity per week, number of pregnancies, age at first pregnancy, frequent headaches, and ever diagnosed with migraine headaches. Current smoking was defined as currently smoking an average of at least one cigarette per day. Past smoking was defined as ever having smoked on a regular basis an average of at least one cigarette a day for six months

or more, but not smoking presently. The total number of chronic medical problems (including diabetes, hepatitis, heart disease, etc.) was summed for each subject.

A number of mental health variables were examined because of the strong association that has been consistently found between mental health and both trauma experiences and PMS. Subjects were asked to self-report ever having been given a diagnosis of anxiety disorder or depression. Current depression was also determined using the Composite International Diagnostic Interview (CIDI) Short Form for major depression.⁵¹ The CIDI-SFMD is a validated instrument designed to identify episodes of major depression occurring in the past 12 months.⁵² We also considered the following variables: use of prescription medications for mental health in the past 6 months, ever had mental health counseling, and ever had psychiatric care for a mental health problem other than drugs or alcohol.

Statistical Analysis

For each of the predictor variables, logistic regression was used to generate univariate odds ratios and 95% confidence intervals to estimate the risk of PMS across the levels of each variable. Separate multivariate logistic regression models were then performed for each group of related variables (demographic and general health variables, mental health variables, and trauma variables). These three multivariate models were constructed by including variables found to be significant in univariate analysis for each of the three groups of related variables. Spearman correlations were also performed for each of the three groups of related variables in order to examine the magnitude of correlations between associated variables. A final multivariate logistic regression model was then developed that included all variables associated with the outcome in the separate multivariate models at $\alpha < 0.05$.

Similar to the procedure followed above, ordinal logistic regression was also performed in order to examine possible differences between the 36 cases with a formal

PMS diagnosis and the 36 with a validated self-report of PMS. Significant differences were not seen for the main predictor variables of interest between these groups, confirming that it was appropriate to combine these two categories and use a dichotomous outcome variable for PMS.

We also investigated a possible interaction between ever having had a mental health problem (defined as having been diagnosed with depression, anxiety, and/or PTSD) and lifetime sexual assault. The interaction term was not found to be significant in univariate analyses, and was thus not included in further models. All analyses were performed using SAS 9.1.

CHAPTER III

RESULTS

Sexual assault experiences were high among women in this case-control study, with 33.1% reporting a completed sexual assault in their lifetime. Sexual assault before the age of 18 was reported by 14.5% of the women and military sexual assault was reported by 13.9%. A history of mental health disorders was also prevalent, with 44.4% reporting a history of depression, 19.5% a history of anxiety disorder, and 18.7% a history of PTSD. The prevalence of PMS was 14.3% for the case-control study (or a population prevalence of 12.6% if the 71 women who did not meet the criteria as validated cases or controls were included in the denominator of the prevalence calculation).

Table 1 shows the frequencies, univariate and adjusted odds ratios of the demographic and general health variables for their association with PMS. No significant differences were found for socioeconomic indicators, such as income, education level, or employment status. While not found to be significantly associated with PMS, a greater amount of care received at the VA in the past 5 years does appear to show a trend with an increasing prevalence of PMS (see figure 2). Age, BMI, frequent headaches, diagnosis of migraine headaches, and being a current smoker were significantly associated with PMS in univariate analysis. Women who had PMS were significantly older (38.6 vs. 35.0 years), had a higher BMI (29.4 vs 27.0), were more likely to have frequent headaches, were more likely to be diagnosed with migraine headaches, and were more likely to be current smokers. In the multivariate model that adjusted for the variables that were significant in univariate analysis, age, BMI, current smoking, and a diagnosis of migraine headaches remained significantly associated with PMS.

Figure 2: Relationship between the prevalence of PMS and the amount of care received at the VA in the past 5 years

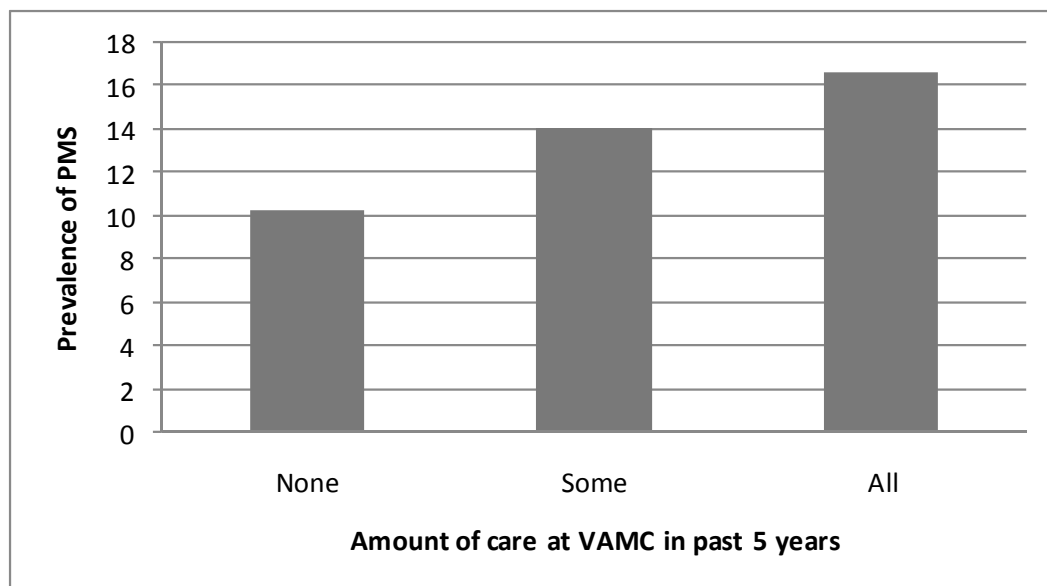


Table 2 presents the frequencies, univariate odds ratios, and adjusted odds ratios for the associations between the mental health variables and PMS. The number of chronic medical problems was also included with the group of mental health variables and was measured as a continuous variable. All of the mental health variables, with the exception of current PTSD as measured by the DIS-IV subscale for PTSD, were significantly associated with PMS in univariate analysis. The multivariate model that included all of the mental health variables found that a diagnosis of anxiety disorder, current depression, and the number of chronic medical problems remained significantly associated with PMS.

The frequencies, univariate odds ratios, and adjusted odds ratios for the association between the trauma variables and PMS are displayed in table 3. A graphical presentation of the univariate odds ratios for the trauma variables can be seen in figure 3. All of the sexual trauma variables, as well as the number of non-combat related traumas, were significantly associated with PMS in univariate analysis ($p < 0.05$). Neither trauma

experienced in a combat/war zone nor childhood physical abuse was significantly associated with PMS in univariate analysis. When we restricted the univariate analysis for combat-related trauma to the 171 women who had served in a combat zone, the OR and 95% CI were 1.34, 0.29-6.25 (data not shown). After including all trauma variables in a multivariate logistic regression model, completed sexual assault during lifetime was found to be associated with PMS (OR=7.17, 95% CI=1.69-30.47), as was the number of non-combat related traumas (OR=1.22, 95% CI=1.06-1.40).

Figure 3: Univariate ORs and 95% CIs for association between trauma variables and PMS

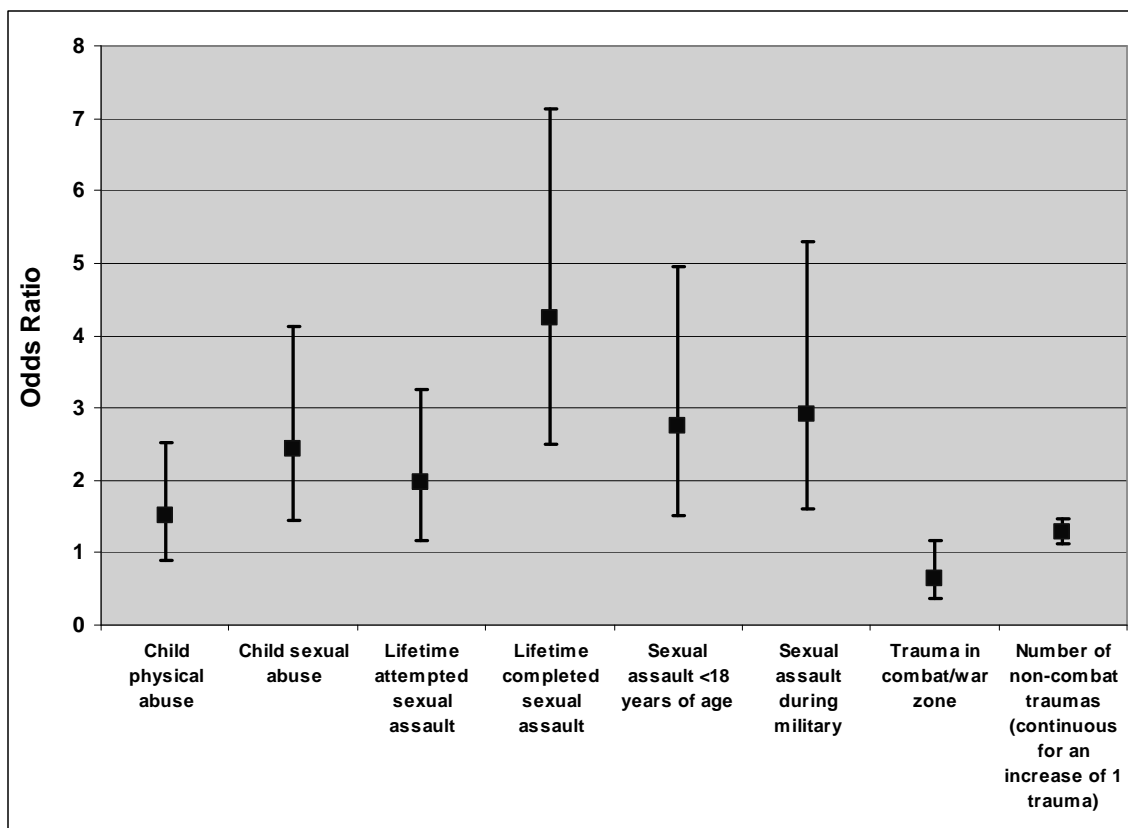


Table 4 shows the odds ratios and 95% confidence intervals as well as the equation parameters for the final multivariate logistic regression model which included age, BMI, diagnosis of migraine headaches, smoking, diagnosis of anxiety disorder, current depression, number of chronic medical problems, number of non-combat related traumas, and completed sexual assault during lifetime. In the final model, the variables that remained significantly associated with PMS were: ever diagnosed with migraine headaches (OR=1.82, 95% CI=1.02-3.25), ever diagnosed with anxiety disorder (OR=2.07, 95% CI=1.12-3.83), and completed sexual assault in lifetime (OR=2.42, 95% CI=1.33-4.40).

Table 1: Frequencies and odds ratios for demographic and general health variables associated with PMS

	No PMS (n=430)	PMS (n=72)	Univariate odds ratio (95% CI)	Multivariate odds ratio† (95% CI)	P-value for multivariate OR
Age (continuous for an increase of 10 years)	35.0 ± 8.6	38.6 ± 7.4	1.67 (1.23-2.27)	1.44 (1.04-2.00)	p= 0.0291
BMI (continuous for an increase of 5 units)	27.0 ± 5.5	29.4 ± 6.4	1.39 (1.14-1.71)	1.35 (1.09-1.67)	p= 0.0061
Annual Household Income (thousands) (continuous for a decrease of 10,000 dollars)	43.8 ± 35.0	41.5 ± 27.5	1.02 (0.94-1.11)	1.01 (0.92-1.09)	p= 0.8978
Number of pregnancies (continuous for a decrease of 1 pregnancy)	1.8 ± 1.6	2.1 ± 2.0	0.88 (0.76-1.01)	0.98 (0.84-1.15)	p= 0.8227
Age at first pregnancy (continuous for a decrease of 5 years)	22.2 ± 4.2	21.5 ± 5.2	1.25 (0.88-1.77)	0.98 (0.66-1.44)	p= 0.9060
Cups of coffee per day (continuous for an increase of 1 cup)	1.4 ± 3.0	1.6 ± 2.5	1.02 (0.94-1.10)	0.98 (0.89- 1.07)	p= 0.6298
Minutes of exercise per week (continuous for a decrease of 50 minutes)	188 ± 279	204 ± 312	0.99 (0.94-1.04)	0.99 (0.94-1.04)	p= 0.6444
Served on active military duty					
No	68 (15.8)	9 (12.5)	ref	ref	
Yes	362 (84.2)	63 (87.5)	1.32 (0.62-2.77)	0.67 (0.30-1.53)	p= 0.3447
Education					
High School/GED	65 (14.1)	9 (12.5)	ref	ref	
Some college or technical	239 (55.6)	45 (62.5)	1.09 (0.44-2.71)	1.61 (0.71-3.65)	
College completion	86 (20.0)	13 (18.1)	1.36 (0.63-2.93)	1.63 (0.62-4.28)	
Some/completed graduate or professional degree	40 (9.3)	5 (6.9)	0.90 (0.28-2.89)	1.30 (0.39-4.40)	p _{trend} =0.5889

† Adjusted for age, BMI , employment status, frequent headaches, diagnosis of migraine headaches, smoking status (never, past, current), ever use of illegal drugs

Table 1(continued)

	No PMS (n=430)	PMS (n=72)	Univariate odds ratio (95% CI)	Multivariate odds ratio† (95% CI)	P-value for multivariate OR
Currently unemployed for wages					
No	322 (74.9)	46 (63.9)	ref	ref	
Yes	108 (25.1)	26 (36.1)	1.68 (0.99-2.86)	1.51 (0.86-2.67)	p= 0.1531
Have health insurance					
No	76 (17.7)	12 (16.7)	ref	ref	
Yes	353 (82.3)	60 (83.3)	1.08 (0.55-2.01)	1.18 (0.58-2.40)	p= 0.6444
Care at VAs in past 5 years					
None	61 (14.2)	7 (9.7)	ref	ref	
Some	249 (57.9)	41 (56.9)	1.44 (0.61-3.35)	1.38 (0.57-3.33)	
All	120 (27.9)	24 (33.3)	1.74 (0.71-4.27)	1.24 (0.48-3.20)	p _{trend} = 0.8251
Frequent Headaches					
No	281 (65.4)	35 (48.6)	ref	ref	
Yes	149 (45.6)	37 (51.4)	1.99 (1.21-3.30)	1.46 (0.82-2.60)	p= 0.1950
Diagnosed with migraine headaches					
No	307 (71.4)	34 (47.2)	ref	ref	
Yes	123 (28.6)	38 (52.8)	2.79 (1.68-4.64)	2.20 (1.24-3.90)	p= 0.0068
Smoking status					
Never	215 (50.0)	26 (36.1)	ref	ref	
Past	94 (21.9)	15 (20.8)	1.32 (0.67-2.60)	1.05 (0.51-2.16)	
Current	121 (28.1)	31 (43.1)	2.12 (1.20-3.73)	1.94 (1.03-3.65)	p _{trend} = 0.0431
Age started smoking (continuous for a decrease of 5 years)	17.6 ± 3.9	17.2 ± 3.2	1.16 (0.73-1.82)	0.99 (0.63-1.58)	p= 0.9950
Ever used illegal drugs					
No	255 (59.3)	37 (51.4)	ref	ref	
Yes	175 (40.7)	35 (48.6)	1.38 (0.84-2.27)	1.00 (0.57-1.75)	p= 0.9928

† Adjusted for age, BMI, employment status, frequent headaches, diagnosis of migraine headaches, smoking status (never, past, current), ever use of illegal drugs

Table 2: Frequencies and odds ratios for mental health variables associated with PMS

	No PMS (n=430)	PMS (n=72)	Univariate OR (95% CI)	Multivariate OR† (95% CI)	P-value for multivariate OR
Prescription medication for mental health in past 6 months					
No	283 (65.8)	28 (38.9)	ref	ref	
Yes	147 (34.2)	44 (61.1)	3.02 (1.81-5.06)	1.26 (0.56-2.59)	p=0.6309
Ever diagnosed with anxiety disorder					
No	359 (83.9)	41 (58.6)	ref	ref	
Yes	69 (16.1)	29 (41.4)	3.68 (2.14-6.32)	2.24 (1.16-4.34)	p=0.0167
Current depression					
No	322 (74.9)	34 (47.2)	ref	ref	
Yes	108 (25.1)	38 (52.8)	3.33 (2.00-5.56)	2.04 (1.05-3.97)	p=0.0353
Ever diagnosed with depression					
No	253 (59.1)	23 (32.4)	ref	ref	
Yes	175 (40.9)	48 (67.6)	3.02 (1.77-5.14)	1.00 (0.46-2.16)	p=0.9939
Ever had mental health counseling					
No	207 (48.1)	15 (20.8)	ref	ref	
Yes	223 (51.9)	57 (79.2)	3.53 (1.94-6.42)	2.08 (0.97-4.50)	p=0.0614
Ever had psychiatric care for mental health					
No	284 (66.2)	28 (38.9)	ref	ref	
Yes	145 (33.8)	44 (61.1)	3.08 (1.84-5.15)	1.16 (0.54-2.50)	p=0.7001
Number of Chronic Medical Problems (continuous- for an increase of 1 condition)					
	0.33 ± 0.73	0.71 ± 1.05	1.62 (1.25-2.09)	1.54 (1.15-2.06)	p=0.0037
Current PTSD					
No	353 (82.1)	54 (75.0)	ref	ref	
Yes	77 (17.9)	18 (25.0)	1.53 (0.85-2.75)	0.74 (0.36-1.50)	p=0.3984
Ever diagnosed with PTSD					
No	355 (82.9)	49 (70.0)	ref	ref	
Yes	73 (17.1)	21 (30.0)	2.08 (1.18-3.68)	0.89 (0.44-1.80)	p=0.7384

† Adjusted for all other variables in the table (adjusted for number of chronic medical problems as a continuous variable)

Table 3: Frequencies and odds ratios for trauma variables associated with PMS

	No PMS (n=430)	PMS (n=72)	Univariate OR (95% CI)	Multivariate OR† (95% CI)	P value for multivariate OR
Childhood physical abuse					
No	297 (69.1)	43 (59.7)	ref	ref	
Yes	133 (30.9)	29 (40.3)	1.51 (0.90-2.52)	0.89 (0.49-1.62)	p=0.7049
Childhood sexual abuse					
No	337 (78.4)	43 (59.7)	ref	ref	
Yes	93 (21.6)	29 (40.3)	2.44 (1.45-4.13)	1.78 (0.92-3.45)	p=0.0867
Attempted Sexual assault during lifetime					
No	299 (69.9)	39 (54.2)	ref	ref	
Yes	129 (30.1)	33 (45.8)	1.96 (1.18-3.26)	1.15 (0.62-2.10)	p=0.6598
Completed sexual assault during lifetime					
No	307 (71.7)	27 (37.5)	ref	ref	
Yes	121 (29.3)	45 (62.5)	4.23 (2.51-7.12)	7.17 (1.69-30.47)	p=0.0076
Number of rapes in lifetime					
0	272 (63.3)	25 (34.7)	ref	ref	
1	79 (18.4)	20 (27.8)	2.75 (1.45-5.22)	0.39 (0.09-1.63)	
2+	79 (18.4)	27 (37.5)	3.72 (2.04-6.77)	0.40 (0.09-1.73)	p _{trend} =0.4053
Sexual assault <18 years of age					
No	377 (87.7)	52 (72.2)	ref	ref	
Yes	53 (12.3)	20 (27.8)	2.74 (1.52-4.94)	0.82 (0.36-1.88)	p=0.6380
Sexual assault during military					
No	380 (88.4)	52 (72.2)	ref	ref	
Yes	50 (11.6)	20 (27.8)	2.92 (1.61-5.30)	1.09 (0.49-2.40)	p=0.8372
Trauma in combat/war zone					
No	299 (69.5)	56 (77.8)	ref	ref	
Yes	131 (30.5)	16 (22.2)	0.65 (0.36-1.18)	0.68 (0.36-1.29)	p=0.2377
Number of traumas in a non-combat/war zone (continuous for an increase of 1 trauma)					
	2.1 ± 1.7	3.0 ± 2.2	1.29 (1.13-1.47)	1.22 (1.06-1.40)	p=0.0072

† Adjusted for all other variables in the table

Table 4: Final multivariate logistic regression model for factors associated with PMS

Predictors	Parameter estimate	Standard Error	Multivariate OR† (95% CI)	P value
Intercept	-5.2469	0.8970		p <0.001
Age (Continuous-for an increase of 10 years)	0.0216	0.0181	1.24 (0.87-1.77)	p= 0.2340
BMI (continuous- for an increase of 5 units)	0.0404	0.0237	1.22 (0.97-1.54)	p= 0.0878
Smoking status				
Never			ref	
Past	-0.2547	0.2364	0.80 (0.37-1.72)	
Current	0.2803	0.2033	1.36 (0.71-2.61)	p _{trend} = 0.3636
Ever diagnosed with migraine headaches	0.5965	0.2965	1.82 (1.02-3.25)	p= 0.0442
Ever diagnosed with anxiety disorder	0.7267	0.3148	2.07 (1.12-3.83)	p= 0.0210
Number of non-combat related traumas (continuous for an increase of 1 trauma)	0.1289	0.0765	1.14 (0.98-1.32)	p= 0.0921
Number of Chronic Medical Problems (continuous for an increase of 1 condition)	0.2151	0.1571	1.24 (0.91-1.69)	p= 0.1709
Completed sexual assault during lifetime	0.8839	0.3050	2.42 (1.33-4.40)	p= 0.0038
Current depression	0.5475	0.3017	1.73 (0.96-3.12)	p= 0.0696

† Adjusted for all other variables in the table

CHAPTER IV

DISCUSSION

Findings from this study among female military veterans indicate that a history of trauma, particularly sexual trauma, is associated with moderate to severe PMS. We found a multivariate odds ratio of 2.42 (95% CI= 1.33-4.40) for the association between lifetime completed sexual assault and moderate or severe PMS. It did not appear that the time period of the sexual assault mattered significantly as we did not see any higher associations for sexual assault occurring before age 18 or during military service, but rather that any history of sexual assault seemed to be the most important predictor. The overall findings for the relationship between PMS and the various trauma variables measured in this study suggest that there may be a stronger association between sexual trauma and PMS than between non-sexual trauma and PMS. This is consistent with evidence that sexual trauma may be associated with a more severe array of symptoms and conditions than non-sexual trauma. For example, a study among 327 women veterans treated in a VA clinic found sexual stress was almost four times as influential in the development of PTSD as was duty-related stress.⁵³ It appears from our data that this may hold true for the association with PMS as well, although further research is needed to confirm this.

Sexual Trauma and PMS

This study provides further evidence of high rates of sexual assault among women with PMS, with 62.5% of female veterans with PMS reporting a history of completed sexual assault in their lifetime. In studies reviewed by Golding, Taylor et al.¹⁰, the prevalence of sexual assault history among women with PMS ranged from 32-50%. The higher prevalence of sexual assault among women in our study is consistent with the literature suggesting that women who have served in the military have more extensive

abuse histories than civilian women, frequently joining the military to escape violent family situations and then often being further victimized during service.^{39,54,55}

Most studies, including the present one, that have examined the relationship between sexual abuse and PMS have been based on cross-sectional surveys. This makes it difficult to confirm a temporal relationship between the abuse incident(s) and the onset of PMS, particularly when the timing of the trauma events and the onset of PMS is not known. The one prospective study we are aware of found a significant risk (adjusted OR= 4.2, 95% CI= 1.2-12.0) of developing PMDD after experiencing traumatic events (according to DSM-IV PTSD criteria A1 and A2) in a community sample of women age 14-24.⁹ Findings from this study also suggested that subthreshold PMDD (defined as failing to meet the DSM-IV criteria for PMDD by only 1 criterion) may be aggravated by traumatic events, leading to full expression of the disorder. Thus, in women with mild or moderate PMS symptoms, it is possible that traumatic events may promote the development of more severe symptomatology. In our study, we attempted to examine whether abuse history was related to the severity of PMS symptoms (moderate vs. severe); however, we had too few cases classified as having severe symptoms to observe any significant results. Further examination of whether women with histories of sexual abuse develop more severe PMS symptoms would be valuable.

The underlying mechanisms for the observed association between sexual assault and PMS are unknown. Due to the strong correlations that exist between sexual abuse, stress, and PMS, it has been theorized that stress may be the mechanism by which abuse affects menstrual health, although evidence for this is tentative. In a population based sample of 874 women, subjects with a high score on the Perceived Stress Scale⁵⁶ were significantly more likely to have PMS than those with a low score (adjusted OR=3.7, 95% CI=1.5-9.6).²⁸ A significant association has also been found between job stress and premenstrual symptoms among active duty military women.²⁹ However, a study among female college students aged 18-25 failed to find that perceived stress, as measured by

the Perceived Stress Scale, significantly mediated the relationship between abuse and premenstrual symptomatology, although they found that 24% of the variance between abuse and premenstrual symptomatology was accounted for by perceived stress.⁸

A few recent studies that have examined biological correlates in women with PMDD have found disruption in stress response systems among women with PMDD and a history of abuse compared to women with PMDD and no history of abuse.^{11,30,57} One study found that women with a history of PMDD and sexual abuse had altered adrenergic function, including significantly lower resting norepinephrine levels, significantly greater β_1 and β_2 -adrenoceptor responsivity, and greater premenstrual phase norepinephrine reactivity to stress compared to non-abused women with PMDD.³⁰ This research further supports a role for stress in the relationship between abuse and PMS/PMDD.

Unfortunately, we did not have a good measure of stress in our study and thus were unable to examine the potentially important relationship between trauma, stress, and PMS.

Trauma, PMS and mental health conditions

This study among female veterans supports existing evidence from civilian populations of high comorbidity rates of psychiatric disorders in women with PMS. In this sample of female veterans, 52.8% of women with PMS met CIDI-SFMD criteria for current depression. In addition, 41.4% of women with PMS reported a history of anxiety disorder and 67.6% reported a history of depression. This is substantially higher than the 40% prevalence of mood and anxiety disorders that was found by Bailey and Cohen²³ in a sample of civilian women seeking treatment for PMS. In another small study, it was found that 77% of women with PMDD and 17% of women without PMDD had suffered from a past Axis I disorder.⁵⁸

It is known that many women with depression report a worsening of their symptoms during the premenstrual phase.¹⁶ For example, in a large study of women with

major depressive disorder, 64% reported a premenstrual worsening of their depression.⁵⁹ With the high rates of coexisting depression we observed among women with PMS in this study, there is the possibility that some of the women we included did not have PMS but rather had premenstrual exacerbation of depression. However, in requiring that PMS symptoms be absent in the week after menstruation in order to qualify as a case, we believe that at least the majority of these women had coexisting depression and PMS as opposed to simply a worsening of depressive symptoms during PMS.

We did find a significant univariate association between PMS and ever being diagnosed with PTSD (OR=2.08, 95% CI=1.18-3.68), however this association became non-significant after adjusting for other mental health variables. It is not clear why this occurred, but it may be related to the correlation between PTSD and other anxiety disorders. The prospective study by Perkonigg et al.⁹ did find a strong cross-sectional association between PTSD and PMDD at baseline (age adjusted OR=11.7, 3.0-46.2), but failed to find a significantly increased risk of developing incident PMDD among those with a diagnosis of PTSD (multivariate OR =0.7, 95% CI=0.1-2.8). However, it should be noted that the prospective analysis was based on a very small number of individuals who developed incident PMDD after 42 months of follow-up. As very few studies have been conducted and the evidence is somewhat conflicting, more research should examine the relationship between trauma, PTSD and PMS.

In addition to the mental health and trauma variables, the study also confirmed previously established associations between PMS and both smoking^{21,22} and high BMI^{21,22,26}. Previous studies have also suggested an association between PMS and migraine headaches, which findings from this study corroborated¹⁶.

Strengths and Limitation of the Study

This study has a number of strengths, including an adequately large sample size to detect significant differences between PMS cases and controls for our predictor variables of interest. Based on the sexual assault exposure prevalence in our cases and controls, the minimum detectable odds ratio was 1.71 to obtain 80 percent power at a significance level of 0.05. The population of female veterans in this study also had a high prevalence of risk factors, including mental health disorders and traumatic experiences which made it possible to evaluate the associations between these factors and PMS. A further strength of the study was the availability of a large selection of potential confounders which enhanced the quality of our assessment of the relationship between trauma and PMS. Also, misclassification bias of PMS cases and controls should be low because the criteria used to define PMS cases and controls were at two opposite extremes of premenstrual experiences and we used fairly strict criteria in determining cases and controls. Finally, the interviews were conducted by well trained interviewers and the determination of PMS, PTSD, depression, and childhood trauma was based on standardized and validated measures.

The study also has some limitations. First, as women were not asked to identify the time of onset of their PMS symptoms or the time period of the traumatic event, we were unable to determine whether or not the traumatic events occurred prior to the onset of PMS. A second limitation is that the women were not asked to identify their specific PMS symptoms, thus we could not examine the prevalence of certain symptoms, and particularly whether mood or physical symptoms predominated in this population. We also did not use a daily symptoms diary to confirm incident diagnosis of PMS as is standard in clinical practice. However, a study from the Nurses' Health Study population found that while a retrospective method may not be as accurate as a prospective diary, it appears to be adequately sensitive to identify risk factors for incident PMS.⁴⁶ Another

limitation of this study is that some recall bias cannot be excluded as the data is based on self-reports of events and symptoms.

An important final limitation of our study concerns the generalizability of the findings to non-military populations where the prevalence of risk factors may be lower. As has been mentioned, female veterans experience higher lifetime rates of sexual and physical assault than women in the general population and also may be exposed to unique military-related stressors, including combat situations and military sexual trauma. Also, the results of a large nationally representative survey found that women veterans who used VA services in the past 3 years scored worse in every domain of mental and physical health measured by the Short Form 36 (SF-36) compared with women in the general population.⁶⁰ Thus, female veterans may also have a greater number of comorbidities than non-veterans, some of which may not have been accounted for in our analyses. Another factor to consider is that, while 90% of the women in our study received all or some of their health care at from the VA, the vast majority of women veterans in the United States do not use VA services.⁶⁰ It has been suggested that women veterans who use VA services may be economically disadvantaged and may have worse health than women veterans who do not use VA services.⁶¹ These reasons suggest that our results may not be generalizable to either non-veterans or to women veterans who do not use VA services.

Recommendations and suggestions for further research

Despite the limitations of this study, the data suggest that women veterans with a history of sexual assault may have an increased prevalence of moderate to severe PMS as compared to non-assaulted women veterans. These results indicate that female veterans would benefit from an increased awareness by VA health care providers of the significant burden caused by PMS, and of the possible associations between traumatic events, mental health conditions, and PMS in this population. Our results are also consistent with the

recommendation by others that health care providers who evaluate women with PMS should screen for sexual abuse history.^{10,32} In particular, screening for sexual abuse history may assist in identifying individuals in need of other psychological treatment in addition to their PMS treatment.¹⁰ Further study assessing the prevalence of PMS and the relationship between sexual trauma, PTSD and PMS among female veterans would be very valuable in extending the findings of this study, and in particular to confirm the temporal relationship between traumatic experiences and the onset of PMS.

APPENDIX
SURVEY QUESTIONS

PMS QUESTIONS

1. PMS1 Have you ever been diagnosed with Premenstrual Syndrome (PMS)?

1. yes 2. no 77. don't know 99. refuse

1a. PMS1A Who made the diagnosis of Premenstrual Syndrome (PMS)?

READ AS NECESSARY

1. family doctor or internist
2. gynecologist
3. other physician
4. psychiatrist/psychologist
5. other therapist
6. nurse practitioner
7. physician assistant
8. other health practitioner
9. self
10. other
77. don't know
99. refuse

1a1. PMS1A1 Who was that?

_____ (fill in)

2. PMS2 Do you think you have premenstrual syndrome?

1. yes 2. no 77. don't know 99. refuse

3. PMS33 Is the overall severity of your symptoms:

READ RESPONSES

1. minimal, with no effect on normal activities
2. mild, noticeable, but not troublesome
3. moderate, interferes with normal activities
4. severe, intolerable, prevents normal activities
77. don't know
99. refuse

4. PMS34 How many days before the first day of your period do your symptoms usually begin?

_____ (# days) 77. don't know 99. refuse
>0-30<

5. **PMS35 How many days do/did your symptoms usually last after your period began?**

_____ (# days) 77. don't know 99. refuse
>0-30<

6. **PMS36 In the week after your menstrual period has stopped, were your symptoms:**

READ RESPONSES

- 1. completely absent
- 2. still present, but less severe than before your period
- 3. present, and as severe as before your period
- 77. don't know
- 99. refuse

7. **PMS37 Have you experienced relationship discord with your spouse or partner because of your menstrual symptoms?**

1. yes 2. no 3. does not apply
77. don't know 99. refuse

7a. **PMS37A Is this discord:**

READ RESPONSES

- 1. mild
- 2. moderate
- 3. severe
- 77. don't know
- 99. refuse

8. **PMS38 Have you experienced difficulties in parenting because of your menstrual symptoms?**

1. yes 2. no 3. does not apply
77. don't know 99. refuse

8a. **PMS38A Is this difficulty:**

READ RESPONSES

- 1. mild
- 2. moderate
- 3. severe
- 77. don't know
- 99. refuse

9. **PMS39 Have you experienced poor work performance or attendance because of your menstrual symptoms?**

1. yes 2. no 3. does not apply
77. don't know 99. Refuse

9a. PMS39A Is this:
READ RESPONSES

- 1. mild
- 2. moderate
- 3. severe
- 77. don't know
- 99. refuse

10. PMS40 Have you experienced social isolation because of your menstrual symptoms?

- 1. yes
- 2. no
- 77. don't know
- 99. refuse

10a. PMS40A Is this isolation:
READ RESPONSES

- 1. mild
- 2. moderate
- 3. severe
- 77. don't know
- 99. refuse

DEMOGRAPHIC AND GENERAL HEALTH QUESTIONS

AGE: AGE_Q I have your age as _____. Is this correct?

- 1. Yes
- 2. No
- 77. Don't know
- 99. Refuse

AGE What is your current age?

- _____
- 77. Don't know
- 99. Refuse

1. DEM15 What is the highest level you have completed in school?

SELECT ONE

- 1. High School/GED completion
- 2. Some college or technical training (including junior college, technical degree, or 3-year R.N. degree)
- 3. College completion (4-year degree)
- 4. Some graduate education (at least 1 year)
- 5. Graduate or professional degree completed
- 77. Don't know
- 99. Refuse

2. **DEM16 Thinking about all of the people in your household, including yourself, please estimate your current annual household income to the nearest \$5,000. (For example, \$10,000, \$15,000, \$20,000, etc.)**

INTERVIEWER: DO NOT ENTER INCOME USING DECIMALS

\$_____ (fill in) 77. Don't know 99. Refuse
>0-1,000,000<

3. **DEM18 Are you currently employed for wages?**

1. Yes 2. No 77. Don't know 99. Refuse

4. **DEM26 Do you currently have health care insurance that covers all or some of your medical bills? (This includes Medicare, Medicaid, Medigap, TRICARE, CHAMPVA, VAMC care, and private insurance. – parentheses added 8/31/06)**

1. Yes 2. No 77. Don't know 99. Refuse

5. **DEM30 In the past 5 years, did you receive all, some, or none of your medical care at Veteran Affairs Medical Centers? Medical care also includes mental health and gynecologic/reproductive care. We do not mean dental care.**

Deleted read responses

1. all 2. some 3. none 77. Don't know 99. Refuse

6. **DEM1 Have you served on regular military duty? Do not include Reserves or National Guard service.**

1. Yes 2. No 77. Don't know 99. Refuse

7. **How tall are you?**

HGT_FT ft **HGT_IN** in 77. don't know 99. Refuse
>4-7< >0-11<

8. **WGT_LB How much do you weigh?**

_____ lbs 77. don't know 99. Refuse
>>90-300< 450<<

9. **GEN4C On average, how many times per week do you exercise?**

_____ (# time) 77. don't know 99. Refuse
0-20

- 9a. **GEN4C1 About how many minutes, on average, do you exercise each time?**

_____ (# minutes) 77. don't know 99. Refuse
>1-300<

These next questions ask about your use of caffeine. Keep in mind that a can of soda pop and a medium cup of coffee or tea is approximately 12 oz.

10. **GEN5** On average, how many cups (or 12 oz glasses) of caffeinated coffee do you drink per day?

/__/_/ 77. don't know 99. Refuse
>>0-15< 25<<

11. **GEN7** In the last 6 months, have you taken any prescription medications for psychological or mental health concerns, such as depression or anxiety?

1. yes 2. no 77. don't know 99. Refuse

12. **GEN9** Do you have frequent headaches?

1. yes 2. no 77. don't know 99. Refuse

13. **GEN10** Has a doctor or other healthcare professional ever told you that you have migraine headaches?

1. yes 2. no 77. don't know 99. Refuse

14. **GEN13** Do you have any chronic medical problems (such as diabetes, hepatitis, or heart disease)?

1. yes 2. no 77. don't know 99. Refuse

- 14a. **GEN13A01 - GEN13A20** What are these chronic medical problems?
GEN13AO01 - GEN13AO20

_____ (list all) 77. don't know 99. Refuse

15. **SMOKE1** Have you ever smoked cigarettes on a regular basis? That is, have you ever smoked an average of at least one cigarette a day for six months or more?

1. yes 2. no 77. don't know 99. refuse

16. **SMOKE7** Do you currently smoke even one cigarette per day?

1. yes 2. no 77. don't know 99. refuse

17. **SAOM5** Have you ever used any illegal drugs, such as marijuana, cocaine, methamphetamines, or prescription drugs not prescribed to you (such as barbiturates, tranquilizers, or sedatives)?

1. Yes 2. No 77. Don't know 99. Refused

MENTAL HEALTH QUESTIONS

1. **MH2 (Has a health care clinician ever diagnosed you with anxiety disorder?)**
 1. yes 2. no 77. don't know 99. refuse
 2. **MH3U (Has a health care clinician ever diagnosed you with depression?)**
 1. yes 2. no 77. don't know 99. refuse
 3. **MH3V (Has a health care clinician ever diagnosed you with PTSD, Post Traumatic Stress Disorder ?)**
 1. yes 2. no 77. don't know 99. refuse
 4. **MH7 Excluding drugs and alcohol, have you ever received counseling for a mental health problem, stressful experience, or other life event?**
 1. yes 2. no 77. don't know 99. refuse
 5. **MH8 Excluding drugs and alcohol, have you ever received psychiatric care for a mental health problem, stressful experience, or other life event?**
 1. yes 2. no 77. don't know 99. refuse
 6. **MH11 During the last 12 months, was there ever a time when you felt sad, blue or depressed for two weeks or more in a row?**
 1. yes 2. no 77. don't know 99. refuse
- For the next few questions, please think of the two-week period during the past 12 months, when these feelings were worst.**
- 6a. **MH11A During that time, did the feelings of being sad, blue, or depressed usually last: all day long, most of the day, about half the day, or less than half the day?**
 READ AS NECESSARY
 1. all day long
 2. most of the day
 3. about half the day
 4. less than half the day
 77. don't know
 99. refuse

6b. MH11B During those two weeks, did you feel this way: every day, almost every day, or less often?

READ AS NECESSARY

- 1. every day
- 2. almost every day
- 3. less often
- 77. don't know
- 99. refuse

6c. MH11C (During those two weeks) did you lose interest in most things like hobbies, work, or activities that usually give your pleasure?

- 1. yes
- 2. no
- 77. don't know
- 99. refuse

6d. MH11D (Thinking about those same two weeks) did you feel more tired out or low on energy than is usual for you?

- 1. yes
- 2. no
- 77. don't know
- 99. refuse

7. MH12 (During those two weeks) did you gain or lose weight without trying, or did you stay about the same?

- 1. gain (without trying)
- 2. lose (without trying)
- 3. both gained and lost (without trying)
- 4. stayed about the same (without trying)
- 5. was on a diet (and stayed the same, gained, lost, or both)
- 77. don't know
- 99. refuse

8. MH13 (During those two weeks), did you have more trouble falling asleep than you usually do?

- 1. yes
- 2. no
- 77. don't know
- 99. refuse

8a. MH13A Did that happen; every night, nearly every night, or less often? (during those two weeks),

READ AS NECESSARY

- 1. every night
- 2. nearly every night
- 3. less often
- 77. don't know
- 99. refuse

9. MH14 (During those two weeks), did you have a lot more trouble concentrating than usual?

- 1. yes
- 2. no
- 77. don't know
- 99. refuse

10. **MH15 People sometimes feel down on themselves, no good, or worthless. During that two week period, did you feel this way?**

1. yes 2. no 77. don't know 99. refuse

11. **MH16 (During those two weeks), did you think a lot about death – either your own, someone else's, or death in general?**

1. yes 2. no 77. don't know 99. refuse

Delete intro and instructions.

12. **MH17 During the past 12 months, about how many weeks altogether did you have these problems or feel this way?**

_____ (fill in) 77. don't know 99. refuse
>2-52<

Think about this most recent time when you had two weeks in a row when you felt this way.

12a. **MH17A How long ago was that?**

_____ (months in the past) 77. don't know 99. refuse
>0-12<

12b. **MH17B Did you tell a doctor about these problems? (By "doctor" I mean either a medical doctor or osteopath, or a student in training to be either a medical doctor or osteopath).**

1. yes 2. no 77. don't know 99. refuse

12c. **MH17C Did you tell any other professional (such as a psychologist, social worker, counselor, nurse, clergy, or other helping professional)?**

1. yes 2. no 77. don't know 99. refuse

12d. **MH17D Did you take medication or use drugs or alcohol more than once for these problems?**

1. yes 2. no 77. don't know 99. refuse

12e. **MH17E How much did these problems interfere with your life or activities: a lot, some, a little, or not at all?**

READ AS NECESSARY

1. a lot
2. some
3. a little
4. not at all
77. don't know
99. refuse

13. **MH18** During the past 12 months, was there ever a time lasting two weeks or more when you lost interest in things like hobbies, work, or activities that usually give you pleasure?

1. yes 2. no 77. don't know 99. refuse

For the next few questions, please think of the two-week period during the past 12 months, when you had the most complete loss of interest in things.

- 13a. **MH18A** (During that two week period,) did the loss of interest usually last: all day long, most of the day, about half the day, or less than half the day?

READ AS NECESSARY

1. all day long
2. most of the day
3. about half the day
4. less than half the day
77. don't know
99. refuse

- 13b. **MH18B** Did you feel this way; every day, almost every day, or less often? (during that two weeks)

READ AS NECESSARY

1. every day
2. almost every day
3. less often
77. don't know
99. refuse

- 13c. **MH18C** (During those two weeks,) did you feel more tired out or low on energy than is usual for you?

1. yes 2. no 77. don't know 99. refuse

14. **MH19** (During those two weeks,) did you gain or lose weight without trying, or did you stay about the same?

1. gain (without trying)
2. lose (without trying)
3. both gained and lost (without trying)
4. stayed about the same (without trying)
5. was on a diet (and stayed the same, gained, lost, or both)
77. don't know
99. refuse

15. **MH20** (During those two weeks,
did you have more trouble falling asleep than you usually do during those two weeks?)
1. yes 2. no 77. don't know 99. refuse
- 15a. **MH20A** Did that happen; every night, nearly every night, or less often?
(during those two weeks,
READ AS NECESSARY
1. every night
2. nearly every night
3. less often
77. don't know
99. refuse
16. **MH21** (During those two weeks,
did you have a lot more trouble concentrating than usual?)
1. yes 2. no 77. don't know 99. refuse
17. **MH22** People sometimes feel down on themselves, no good, or worthless. During that two week period, did you feel this way?
1. yes 2. no 77. don't know 99. refuse
18. **MH23** (During those two weeks,
did you think a lot about death; either your own, someone else's, or death in general during those two weeks?)
1. yes 2. no 77. don't know 99. refuse
19. **MH24** During the past 12 months, about how many weeks altogether did you feel this way?
_____ (fill in) 77. don't know 99. refuse
>2-52<

Think about this most recent time when you had two weeks in a row when you felt this way.

- 19a. **MH24A** How long ago was that?
- _____ (months in the past) 77. don't know 99. refuse
>0-12<
- 19b. **MH24B** Did you tell a doctor about these problems? (By "doctor" I mean either a medical doctor or osteopath, or a student in training to be either a medical doctor or osteopath).
1. yes 2. no 77. don't know 99. refuse

19c. MH24C Did you tell any other professional (such as a psychologist, social worker, counselor, nurse, clergy, or other helping professional)?

1. yes 2. no 77. don't know 99. refuse

19d. MH24D Did you take medication or use drugs or alcohol more than once for these problems?

1. yes 2. no 77. don't know 99. refuse

19e. MH24E How much did these problems interfere with your life or activities: a lot, some, a little, or not at all?

READ AS NECESSARY

1. a lot
2. some
3. a little
4. not at all
77. don't know
99. refuse

20. MH6 Have you ever attempted suicide?

1. yes 2. no 77. don't know 99. refuse

TRAUMA AND PTSD QUESTIONS

Now I am going to read you some statements about experiences that children may have when they are growing up. Please tell me how accurately they describe your childhood experiences.

**1. CT3 (When I was growing up),
people in my family hit me so hard that it left me with bruises or marks.**
READ RESPONSES AS NECESSARY

1. Never true 2. Rarely true 3. Sometimes true 4. Often true 5. Very often true
77. Don't know 99. Refused

**2. CT4 (When I was growing up),
someone tried to make me do sexual things or watch sexual things.**
READ RESPONSES AS NECESSARY

1. Never true 2. Rarely true 3. Sometimes true 4. Often true 5. Very often true
77. Don't know 99. Refused

Another type of stressful event that many women have experienced is sexual violence. Women do not always report such experiences to police or other authorities or discuss them with family or friends.

Sexual assault is someone making you have sex against your will by using force or threatening to harm you or someone close to you. Sexual assault can involve a man or boy forcing you to have sex by putting his penis in your vagina, your mouth, or your anus. Sexual assault can also involve a male or female putting their tongue in your vagina, or fingers or objects in your vagina or anus.

The person committing the assault isn't always a stranger and can be a friend, boyfriend, or even a family member. Such experiences can occur at any time during a woman's life – even as a child. Many girls and women experience more than one assault, or types of assault, over their lifetime. For this study, we are going to consider four different times of life: before you turned 18; after age 18, but before you joined the military; during your military service; and following your discharge.

The following questions, which address sexual assault, are very important in helping us understand factors that affect women's lives and health. We recognize this information is sensitive and personal. We want to reassure you that your answers are confidential and protected.

3. **RP_LIFETIME_ATT** During your lifetime, has anyone, male or female, using force or threat of harm, ever attempted to sexually assault you? By attempted sexual assault, I mean that an attempt was made but penetration did not occur.

1. yes 2. no 77. don't know 99. refuse

4. **RP_LIFETIME_SEX** During your lifetime, has a man or boy, using force or threat of harm, ever made you have sex by putting his penis in your vagina?

1. yes 2. no 77. don't know 99. refuse

- 4a. **RP_LT18_SEX** Did this happen before you were 18 years of age?

1. yes 2. no 77. don't know 99. refuse

- 5c. **RP_MIL_SEX** (Did this happen) during the time you served in regular military service? This does not include Reserve/National Guard service.

1. yes 2. no 77. don't know 99. Refuse

Many people have lived through or witnessed a variety of stressful and traumatic events at some point in their lives. Please tell me if any of the following events have happened to you or if you have witnessed them.

6. **RP25** As a direct result of the sexual assault(s), have you delayed your childbearing?

1. Yes 2. No 77. Don't know 99. Refused

7. **RP26 (As a direct result of the sexual assault(s)) have you decided not to have children?**

1. Yes 2. No 77. Don't know 99. Refused

Now I will ask you some questions about other stressful or traumatic events you may have experienced or witnessed.

8. **PTSD1 Have you served in a military combat area or a war zone?**

1. yes 2. no 77. don't know 99. refuse

Following is a list of experiences you may have had while serving in a combat area or war zone.

9. **PTSD2 While in combat area or a war zone, have you ever been held captive as a prisoner of war?**

1. yes 2. no 77. don't know 99. refuse

10. **PTSD3 (While in combat area or a war zone, have you) ever been wounded?**

1. yes 2. no 77. don't know 99. refuse

11. **PTSD4 (While in combat area or a war zone, have you) ever seen someone being seriously injured?**

1. yes 2. no 77. don't know 99. refuse

12. **PTSD5 (While in combat area or a war zone, have you) ever seen someone killed?**

1. yes 2. no 77. don't know 99. refuse

13. **PTSD6 (While in combat area or a war zone, have you) ever provided medical care to wounded soldiers?**

1. yes 2. no 77. don't know 99. refuse

14. **PTSD7 (While in combat area or a war zone, have you) ever provided medical care to enemy prisoners of war (such as Iraqi soldiers)?**

1. yes 2. no 77. don't know 99. refuse

15. **PTSD8 (While in combat area or a war zone, have you) ever worked with dead bodies?**

1. yes 2. no 77. don't know 99. refuse

16. **PTSD9 (While in combat area or a war zone, have you) ever experienced incoming artillery, mortar or scud missiles?**

1. yes 2. no 77. don't know 99. refuse

17. **PTSD10 (While in combat area or a war zone, have you) ever experienced the threat of chemical or biological attacks that required your wearing a gas mask?**

1. yes 2. no 77. don't know 99. refuse

The following questions are about experiences you may have had over the course of your life, not just during military service.

18. **PTSD11 Have you ever experienced a serious accident, fire, or explosion (for example, an industrial, farm, car, or boating accident)?**

1. yes 2. no 77. don't know 99. refuse

19. **PTSD12 (Have you ever experienced) a natural disaster (for example, tornado, hurricane, flood, or major earthquake) ?**

1. yes 2. no 77. don't know 99. refuse

20. **PTSD13 (Have you ever experienced) non-sexual assault by a family member or someone you know (for example, being mugged, physically attacked, shot, stabbed or held at gunpoint) ?**

1. yes 2. no 77. don't know 99. refuse

21. **PTSD14 (Have you ever experienced) non-sexual assault by a stranger (for example, being mugged, physically attacked, shot, stabbed or held at gunpoint) ?**

1. yes 2. no 77. don't know 99. refuse

22. **PTSD15 (Have you ever experienced) imprisonment (for example, prison inmate, or held hostage) ?**

1. yes 2. no 77. don't know 99. refuse

23. **PTSD16 (Have you ever experienced) torture?**

1. yes 2. no 77. don't know 99. refuse

24. **PTSD17 (Have you ever experienced) a life-threatening illness?**

1. yes 2. no 77. don't know 99. refuse

25. **PTSD18 (Have you ever)**
witnessed someone being seriously injured or killed?

1. yes 2. no 77. don't know 99. refuse

26. **PTSD19 (Have you ever)**
unexpectedly discovered a dead body?

1. yes 2. no 77. don't know 99. refuse

27. **PTSD20 (Have you ever)**
been exposed to radiation, dioxin or other dangerous materials?

1. yes 2. no 77. don't know 99. refuse

28. **PTSD21 (Have you ever experienced)**
the sudden death of a close friend or relative?

1. yes 2. no 77. don't know 99. refuse

29. **PTSD22 (Have you ever experienced)**
any other traumatic event that we have not asked about?

1. yes 2. no 77. don't know 99. refuse

29a. **PTSD22A What was that?**

_____ (fill in) 77. don't know 99. refuse

30. **PTSD23 Of the traumatic events you just listed, which experience bothers you the most?**

1	Combat – Being held prisoner	10	A serious accident, fire or explosion	17	Witnessing a serious injury or killing
2	Combat – being wounded	11	A natural disaster	18	Discovering a dead body
3	Combat- seeing someone injured	12	non sexual assault by a family member/friend	19	Being exposed to a dangerous chemical or radiation
4	Combat – seeing someone killed	13	Non sexual assault by a stranger	20	The sudden death of a close friend or relative
5	Combat –caring for wounded soldiers	14	Non combat Imprisonment	21	Other –as listed
6	Combat –caring for enemy soldiers	15	Non combat torture		
7	Combat –working with dead bodies	16	A life threatening illness		
8	Combat – incoming artillery				
9	Combat – a chemical or biological attack	77	Don' know	99	Refuse

30a. PTSD23A Of the traumatic events you just listed, including your prior report of rape or attempted rape, which experience bothers you the most?

1	Combat – Being held prisoner	10	A serious accident, fire or explosion	17	Witnessing a serious injury or killing
2	Combat – being wounded	11	A natural disaster	18	Discovering a dead body
3	Combat- seeing someone injured	12	non sexual assault by a family member/friend	19	Being exposed to a dangerous chemical or radiation
4	Combat – seeing someone killed	13	Non sexual assault by a stranger	20	The sudden death of a close friend or relative
5	Combat –caring for wounded soldiers	14	Non combat Imprisonment	21	Other –as listed
6	Combat –caring for enemy soldiers	15	Non combat torture	22	Rape
7	Combat –working with dead bodies	16	A life threatening illness	23	Attempted Rape
8	Combat – incoming artillery				
9	Combat – a chemical or biological attack	77	Don' know	99	Refuse

Now I am going to ask about your experience with (fill in choice from 23 or 23a, or “rape or attempted rape”).

31. PTSD24 How long ago did this happen?

IF RAPE OR ATTEMPTED RAPE IS FILLED IN AND MORE THAN ONE RAPE OR ATTEMPTED RAPE WAS REPORTED:

ASK RESPONDENT TO ANSWER THESE QUESTIONS ABOUT THE ASSAULT WHEN THE SYMPTOMS SHE JUST REPORTED BOTHERED HER THE MOST.

READ AS NECESSARY

1. less than 1 month ago
2. 2-3 months ago
3. 4-6 months ago
4. 7 months – 2 years
5. 3-5 years
6. more than 5 years ago
77. don't know
99. refuse

32. PTSD25 Were you physically injured?

1. yes 2. no 77. don't know 99. refuse

33. PTSD26 Was someone else physically injured?

1. yes 2. no 77. don't know 99. refuse

34. PTSD27 Did you think that your life was in danger?

1. yes 2. no 77. don't know 99. refuse

35. **PTSD28 Did you think that someone else's life was in danger?**
 1. yes 2. no 77. don't know 99. refuse
36. **PTSD29 Did you feel helpless?**
 1. yes 2. no 77. don't know 99. refuse
37. **PTSD30 Did you feel terrified?**
 1. yes 2. no 77. don't know 99. refuse

Now I am going to read a list of problems that people sometimes have after experiencing a traumatic event. I would like for you to rate each problem with respect to your experience of (fill in choice at 23 or 23a or "rape or attempted rape").

I will ask you to tell me which best describes how often that problem has bothered you in the past two weeks.

38. **PTSD31 In the past two weeks, how often have you had recurrent or intrusive, distressing thoughts or recollections about the trauma?**

READ RESPONSES

1. not at all
 2. once a week or less
 3. 2-4 times a week
 4. 5 or more times a week
 77. don't know
 99. refuse

39. **PTSD32 (In the past two weeks.) how often have you had recurrent bad dreams or nightmares about the trauma?**

READ AS NECESSARY

1. not at all
 2. once a week or less
 3. 2-4 times a week
 4. 5 or more times a week
 77. don't know
 99. refuse

40. **PTSD33 (In the past two weeks.) how often have you had the experience of suddenly reliving the trauma, flashbacks of it, acting or feeling as if it were re-occurring?**

READ AS NECESSARY

1. not at all
 2. once a week or less
 3. 2-4 times a week
 4. 5 or more times a week
 77. don't know
 99. refuse

41. **PTSD34** (In the past two weeks.)
how often have you been intensely emotionally upset when reminded of the trauma (includes anniversary reactions)?
 READ AS NECESSARY
1. not at all
 2. once a week or less
 3. 2-4 times a week
 4. 5 or more times a week
 77. don't know
 99. refuse
42. **PTSD35** (In the past two weeks.) **how often have you had intense physical reactions (eg., sweaty, heart palpitations) when reminded of the trauma?**
 READ AS NECESSARY
1. not at all
 2. once a week or less
 3. 2-4 times a week
 4. 5 or more times a week
 77. don't know
 99. refuse
43. **PTSD36** (In the past two weeks.)
how often have you persistently been making efforts to avoid thoughts or feelings associated with the trauma?
 READ AS NECESSARY
1. not at all
 2. once a week or less
 3. 2-4 times a week
 4. 5 or more times a week
 77. don't know
 99. refuse
44. **PTSD37** (In the past two weeks.)
how often have you persistently been making efforts to avoid activities, situations, or places that remind you of the trauma?
 READ AS NECESSARY
1. not at all
 2. once a week or less
 3. 2-4 times a week
 4. 5 or more times a week
 77. don't know
 99. refuse
45. **PTSD38** (In the past two weeks.)
how often were there important aspects about the trauma that you could not recall?
 READ AS NECESSARY
1. not at all
 2. once a week or less
 3. 2-4 times a week
 4. 5 or more times a week
 77. don't know

99. refuse

- 46. PTSD39 (In the past two weeks.)**
how often did you markedly lose interest in free time activities because of the trauma?
 READ AS NECESSARY
1. not at all
 2. once a week or less
 3. 2-4 times a week
 4. 5 or more times a week
 77. don't know
 99. refuse
- 47. PTSD40 (In the past two weeks.)**
how often did you feel distant or cut off from people around you because of the trauma?
 READ AS NECESSARY
1. not at all
 2. once a week or less
 3. 2-4 times a week
 4. 5 or more times a week
 77. don't know
 99. refuse
- 48. PTSD41 (In the past two weeks.)**
how often did you feel emotionally numb (for example, being unable to cry or unable to have loving feelings) ?
 READ AS NECESSARY
1. not at all
 2. once a week or less
 3. 2-4 times a week
 4. 5 or more times a week
 77. don't know
 99. refuse
- 49. PTSD42 (In the past two weeks.)**
how often did you feel as if your future plans or hopes would not come true (for example, you will not have career, marriage, children or a long life).
 READ AS NECESSARY
1. not at all
 2. once a week or less
 3. 2-4 times a week
 4. 5 or more times a week
 77. don't know
 99. refuse

50. **PTSD43** (In the past two weeks.)
how often have you had persistent difficulty falling or staying asleep?
READ AS NECESSARY
1. not at all
 2. once a week or less
 3. 2-4 times a week
 4. 5 or more times a week
 77. don't know
 99. refuse
51. **PTSD44** (In the past two weeks.) **how often have you been continuously irritable or had outbursts of anger?** READ AS NECESSARY
1. not at all
 2. once a week or less
 3. 2-4 times a week
 4. 5 or more times a week
 77. don't know
 99. refuse
52. **PTSD45** (In the past two weeks.)
how often have you had persistent difficulty concentrating?
READ AS NECESSARY
1. not at all
 2. once a week or less
 3. 2-4 times a week
 4. 5 or more times a week
 77. don't know
 99. refuse
53. **PTSD46** (In the past two weeks.)
how often have you been overly alert (for example, checking to see who is around you, being uncomfortable with your back to a door, etc.)
READ AS NECESSARY
1. not at all
 2. once a week or less
 3. 2-4 times a week
 4. 5 or more times a week
 77. don't know
 99. refuse
54. **PTSD47** (In the past two weeks.)
how often have you been jumpier, or more easily startled, because of the trauma?
READ AS NECESSARY
1. not at all
 2. once a week or less
 3. 2-4 times a week
 4. 5 or more times a week
 77. don't know
 99. refuse

55. PTSD48 How long have you been experiencing the problems you just reported?

READ RESPONSES

- 1. less than 1 month
- 2. 1-3 months
- 3. more than 3 months
- 77. don't know
- 99. refuse

56a. PTSD48A Has it been one year or more?

- 1. yes
- 2. no
- 77. don't know
- 99. refuse

48a1. PTSD48A1 How many years ?

_____ 77. don't know 99. refuse
 Years
 >1-51<

48a2. PTSD48A2 How many months?

_____ 77. don't know 99. refuse
 Months
 >0-11<

57. PTSD49 How long after the traumatic event did these problems begin?

READ RESPONSES

- 1. less than 6 months
- 2. 6 months or more
- 77. don't know
- 99. refuse

58. PTSD50 In the past two weeks, have the problems you just listed interfered with your work?

- 1. yes
- 2. no
- 77. don't know
- 99. refuse

59. PTSD51 (In the past two weeks,) have the problems you just listed interfered with your household chores and duties.

- 1. yes
- 2. no
- 77. don't know
- 99. refuse

60. PTSD52 (In the past two weeks, have the problems you just listed) interfered with your relationships with friends.

- 1. yes
- 2. no
- 77. don't know
- 99. refuse

61. PTSD53 (In the past two weeks, have the problems you just listed) interfered with your fun and leisure activities

- 1. yes
- 2. no
- 77. don't know
- 99. refuse

62. **PTSD54** (In the past two weeks, have the problems you just listed) **interfered with your schoolwork.**
1. yes 2. no 77. don't know 99. refuse
63. **PTSD55** (In the past two weeks, have the problems you just listed) **interfered with your relationships with your family.**
1. yes 2. no 77. don't know 99. refuse
64. **PTSD56** (In the past two weeks, have the problems you just listed) **interfered with your sex life.**
1. yes 2. no 77. don't know 99. refuse
65. **PTSD57** (In the past two weeks, have the problems you just listed) **interfered with your general satisfaction with life.**
1. yes 2. no 77. don't know 99. refuse
66. **PTSD58** (In the past two weeks, have the problems you just listed) **interfered with your overall level of functioning in all areas of your life.**
1. yes 2. no 77. don't know 99. refuse

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