Posttraumatic Stress Disorder among Female Vietnam Veterans: A Causal Model of Etiology

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Objectives. The Vietnam and Persian Gulf wars have awakened people to the realization that military service can be traumatizing for women as well as men. This study investigated the etiological roles of both war and sexual trauma in the development of chronic posttraumatic stress disorder among female Vietnam veterans.

Methods. Data from the National Vietnam Veterans Readjustment Study for 396 Vietnam theater women and 250 Vietnam era women were analyzed with structural equation modeling.

Results. An etiological model with highly satisfactory fit and parsimony was developed. Exposure to war trauma contributed to the probability of posttraumatic stress disorder in theater women, as did sexual trauma in both theater and era women. Lack of social support at the time of homecoming acted as a powerful mediator of trauma for both groups of women.

Conclusions. Within the constraints and assumptions of causal modeling, there is evidence that both war trauma and sexual trauma are powerful contributors to the development of posttraumatic stress disorder among female Vietnam veterans. (*Am J Public Health.* 1997;87:169–175)

Introduction

Historically, women in the military have been treated unequally relative to men.[1,2] For years, there were no studies of the stresses of military service for women. Then women who served in the Vietnam theater as nurses started to report their traumatic experiences and distress.[3–5] These personal accounts were broadened by surveys of women veterans in which an empirical association was demonstrated between exposure to the death and dying of combatants and the development of psychological disorders.[6–8] For the most part, however, these reports gave limited attention to the role of sexual traumatization.

More recent reports suggest that sexual traumatization in the military is more common than was previously supposed and may be of major importance to the etiology of posttraumatic stress disorder.[9–11] The National Vietnam Veterans Readjustment Study included a sizable sample of female Vietnam veterans.[6] Although the published report of the study considered only women's exposure to war traumas, the study also collected information that can be used to examine the role of sexual traumatization.

This study used the National Vietnam Veterans Readjustment Study database to develop a causal model of the etiology of chronic posttraumatic stress disorder among female veterans that addressed the role of sexual and war traumas. The model included variables found to contribute to posttraumatic stress disorder among male veterans,[12,13] as well as other variables more unique to women's experiences. Causal priority was assigned according to the temporal ordering of the variables: (1) premilitary risk factors and traumatic exposure, (2) military service as a nurse, (3) war and sexual traumatic exposure in the military, (4) nature of the homecoming reception, and (5) traumatic exposure after military service. Since posttraumatic stress disorder is comorbid with several other disorders, it is quite possible that the etiological models for comorbid disorders would be similar to that for posttraumatic stress disorder in some respects. We do not claim, therefore, that the etiological model described here is unique to posttraumatic stress disorder, but only that it applies to the disorder.

The general goal for developing these models was to further elucidate the major pathways mediating causation between sets of variables across the historical time intervals. There were three more specific goals. The first was to compare the importance of war trauma and sexual trauma in the etiology of chronic posttraumatic stress disorder among women who served in a war zone. The second was to compare the antecedents of chronic posttraumatic stress disorder across gender among veterans who served in a war zone. The third was to compare the contributory role of sexual trauma among women who served in a war zone and those who served outside the war zone during the same period.

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Methods

Sample

The National Vietnam Veterans Readjustment Study included national samples of 433 female Vietnam theater veterans and 300 female Vietnam era veterans. Vietnam theater veterans are those who served in Vietnam or its surrounding waters or airspace between 1964 and 1975. Vietnam era veterans are those who served in some location other than the Vietnam theater during this period. Nurses were oversampled in the National Vietnam Veterans Readjustment Study among era women to maximize comparability with theater women, who were predominantly nurses.[6] Ethnic minority subjects and Vietnam era women who served in a war zone at some other time were dropped from the analyses because of their small numbers. Incomplete data resulted in 7 additional Vietnam theater women and 12 Vietnam era women being dropped; thus, the final sample consisted of 396 theater women and 250 era women.

Vietnam theater and Vietnam era veterans averaged 46.8 (SD = 8.2) and 44.99 (SD = 8.5) years of age and 15.7 (SD = 2.3) and 14.8 (SD = 2.3) years of education, respectively. Forty-eight percent of theater and 62% of era women were married, 15% of theater and 18% of era women were divorced or separated, and 36% of theater and 18% of era women had never been married. Eight percent of the theater women and 2% of the era women were estimated to have posttraumatic stress disorder at the time of the survey, which was conducted from 1986 to 1988.

Measures

Premilitary risk factors and traumas. Three premilitary risk factors and traumas figured significantly in the model for men: childhood physical and sexual abuse, family instability, and antisocial behavior.[13]

Childhood physical or sexual abuse was coded dichotomously from the list of traumatic events and explicit physical abuse. Any event characterized by the veteran as "physical assault, torture, rape, abuse, mugging or similar assault" that involved her as a victim and that occurred before she was 18 years of age was coded positive for abuse. In addition, a veteran's report that, as a child, she had been spanked or hit "hard enough that [she] had marks or bruises, had to stay in bed, or see a doctor" was coded positive for abuse. Fifty-nine (15%) Vietnam theater women and 55 (22%) Vietnam era women met these criteria.

Family instability was measured by the Family Stability Scale.[14] This instrument, composed of 11 dichotomous items, assesses events experienced before the age of 18 years (e.g., parental separation, divorce, or death; living in a foster home or orphanage; or getting into trouble with authorities). Mean scores were 1.43 (SD = 1.28) for Vietnam theater women and 1.65 (SD = 1.53) for Vietnam era women (the scale's score range is 0–11).

Eleven antisocial behaviors suggestive of a conduct disorder before the age of 15 years were taken from the list compiled by Helzer.[15] These behaviors include trouble with the law or school officials, running away from home, lying, drinking or using drugs, and stealing. Mean antisocial behavior scores were 0.53 (SD = 0.82) for Vietnam theater women and 0.67 (SD = 1.06) for Vietnam era women (scale's score range: 0–11).

Marital separation and educational attainment prior to entering military service were other premilitary risk factors included on the basis of an association with posttraumatic stress disorder among women in the National Vietnam Veterans Readjustment Study[6] as well as the civilian population.[16] Marital separation was defined as having been either divorced or separated before the time of entry into military service. Sixteen (4%) Vietnam theater women and 17 (7%) Vietnam era women met this criterion. Educational attainment prior to the military was represented by mean number of years of education (13.84 [SD = 2.04] for theater women and 13.31 [SD = 1.90] for era women). Although educational level was included as a component of family instability, its prominence in major studies of military and civilian populations[6,16] warranted its inclusion as a separate risk factor as well.

Service as a nurse and traumatic exposure while in the military. Service as a nurse was singled out because of its identification as a particularly traumatic placement for women in the Vietnam theater. Exposure to attack and exposure to a continual stream of casualties, coupled with the inability to save the lives of many of the injured individuals, were more extreme stressors than those typically faced by women in other specialties. Three hundred thirty-three (84%) Vietnam theater women and 130 (52%) Vietnam era women had served as nurses.

Three levels of sexual trauma were used: none (coded as 0), harassment (coded as 1), and assault (coded as 2) (κ = .88). This item was coded independently by two of the authors from free-form answers to the following questions: "While serving in or around Vietnam/in the military, were there any ways you were treated unfairly or badly because you are a woman?" and (if so) "In what ways were you treated unfairly or badly?" It is possible that the requirement of reporting these experiences face to face to an interviewer and the absence of a checklist to prompt respondents' memory led to an underreporting of such experiences. Assault was reported by 4 (1%) Vietnam theater women and 1 (0.4%) Vietnam era woman, while harassment was reported by 25 (6.2%) theater women and 7 (2.7%) era women.

War trauma was measured by the Brief War Zone Stress Exposure Scale for Women.[17] This scale is composed of the 35 nonredundant items that loaded most highly on the original war stress factors derived for women in the National Vietnam Veterans Readjustment Study.[18] The new scale has excellent internal consistency (α = .90) and correlation with the full scale (r = .90). No information concerning norms is available as yet. For Vietnam theater women, the mean score was 92.38 (SD = 15.53) (scale's score range: 35–163). A comparable measure for Vietnam era women was not applicable.

Homecoming reception. Homecoming reception was represented by low familial support and a rejecting societal reception, both of which have been found to be instrumental in the model for posttraumatic stress disorder among men.[13]

Familial support was measured by two scales coded in the direction of low support. Unavailability of help was the sum of four questions (α = .72) asking whether, at the time of homecoming, there was someone the veteran could turn to in time of need (e.g., someone she could borrow money from in case of an emergency, could count on to help her in case of a serious injury or illness, or could count on to pick up her spirits when she was feeling down). The mean help score in this study was 1.55 (SD = 1.06) (scale's score range: 0–4). Unavailability of someone to talk to and confide in at the time of homecoming was the sum of three questions (α = .52) asking whether the veteran had anyone in her life she could talk with and could count on for understanding and advice and whether there

TABLE 1—Bivariate Correlations among Model Variables: Vietnam Theater Women

	Marital Separation	Childhood Abuse	Family Instability	Educational Level	Conduct Disorder	Nursing Specialty	Sexual Trauma	War Trauma	Low Talk	Low Help	Rejecting Reception	Postmilitary Trauma	Posttraumatic Stress Disorder
Marital separation	...												
Childhood abuse	.13	...											
Family instability	.08	.06	...										
Educational level	−.09	−.01	−.05	...									
Conduct disorder	.07	.14	.22	−.02	...								
Nursing specialty	−.05	−.03	−.16	.06	−.16	...							
Sexual trauma	.03	.18	.11	.04	.10	.03	...						
War trauma	.03	.01	.04	.09	.01	.41	.10	...					
Low talk	.04	.10	.03	.09	.05	.01	.12	.16	...				
Low help	.10	.14	.14	−.05	.03	−.12	.09	.11	.36	...			
Rejecting reception	.02	.10	.05	.01	−.07	.06	.17	.13	.23	.17	...		
Postmilitary trauma	−.04	.12	.00	−.01	.06	.09	.07	.10	.13	.07	.04	...	
Posttraumatic stress disorder	−.02	.19	.06	.05	.05	.02	.27	.27	.41	.45	.28	.14	...

Note. Correlations of |.10| or higher were significant at $P < .05$. n = 396.

TABLE 2—Bivariate Correlations among Model Variables: Vietnam Era Women

	Marital Separation	Childhood Abuse	Family Instability	Educational Level	Conduct Disorder	Nursing Specialty	Sexual Trauma	Low Talk	Low Help	Rejecting Reception	Postmilitary Trauma	Posttraumatic Stress Disorder
Marital separation	...											
Childhood abuse	−.01	...										
Family instability	.21	.24	...									
Educational level	−.03	−.10	−.19	...								
Conduct disorder	.05	.21	.29	−.12	...							
Nursing specialty	−.15	−.05	−.25	.37	−.27	...						
Sexual trauma	.11	−.01	.02	.05	.00	−.08	...					
Low talk	.05	.18	.28	−.10	.14	−.20	.13	...				
Low help	.14	.09	.23	−.20	.23	−.32	.17	.44	...			
Rejecting reception	.06	.10	.19	−.01	.06	−.09	.23	.26	.21	...		
Postmilitary trauma	.16	.12	.04	.03	.13	−.15	.06	.05	.21	.08	...	
Posttraumatic stress disorder	.02	.16	.01	.00	.09	−.05	.26	.27	.30	.18	−.01	...

Note. Correlations of |.12| or higher were significant at $P < .05$. n = 250.

TABLE 3—Adequacy of the Models of Vietnam Theater and Vietnam Era Women according to Fit and Parsimony

		Fit		Parsimony	
Model	n	Root Mean Square Residual	Comparative Fit Index	Consistent Information Criterion	Parsimonious Fit Index
Full model					
Theater women	396	0.040	0.969	−51	0.147
Era women	250	0.037	0.973	−44	0.145
Reduced model					
Theater women	396	0.061	0.951	−160	0.529
Era women	250	0.073	0.938	−118	0.488

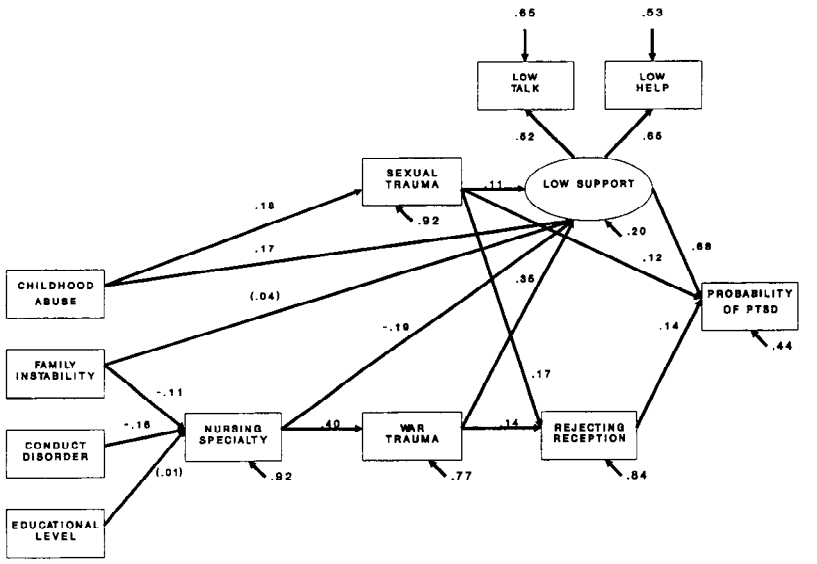

FIGURE 1—Etiological model for probability of posttraumatic stress disorder among Vietnam theater women.

were people with whom she actually did talk about the war. The mean score for this scale was 3.70 (SD = 0.96) (scale's score range: 3–6). Low help and low talk scores correlated .36 and .44 with each other for Vietnam theater and Vietnam era women, respectively, so a latent variable of low support was generated in the model.

Societal reception was measured as the sum of three questions ($\alpha = .74$) concerning the extent to which the veteran experienced the American people as making her feel at home, respected her for having served in the armed forces, and made her feel proud to have served in the armed forces. Mean reception scores were 8.55 (SD = 3.07) for theater women and 8.76 (SD = 3.01) for era women (scale's score range: 3–15). Reception was coded with high scores representing rejection.

Postmilitary trauma. Postmilitary trauma, which was represented dichotomously, covered exposure to physical or sexual abuse from the time of discharge to the time of the survey. A similar variable was found to make a significant contribution to the men's model of posttraumatic stress disorder.[13] Sixteen (4%) Vietnam theater women and 10 (4%) Vietnam era women met the criteria for postmilitary trauma.

Posttraumatic stress disorder. Posttraumatic stress disorder was represented by the predicted probability (as computed by the National Vietnam Veterans Readjustment Study) of being diagnosed with the disorder at the time of the survey. This variable was derived by optimizing the prediction of current posttraumatic stress disorder, as determined by psychiatric interview in a clinical subsample, from other variables (including two standard measures of posttraumatic stress disorder) available in both the clinical subsample and the total survey sample.[18] Mean probability levels were .08 (SD = .21) for theater women and .02 (SD = .11) for era women. The National Vietnam Veterans Readjustment Study did not date onset precisely, especially if it was reported to have occurred more than 3 years previously. Also, there was no uniform definition of the traumatic event(s) to which posttraumatic stress disorder symptoms were being referred across the variety of measures from which the probability of the disorder was generated. For these reasons, we did not attempt to include onset in our model.

Data Analyses

Although the data were cross sectional and the reporting was retrospective, the variables had a clear historical ordering that was adopted as the logical basis for specification of the model. The five premilitary variables were exogenous variables whose causation resided outside the scope of the model. Noncausal associations among the exogenous variables were included in the estimation of the model but are not diagrammed in the figures. They can be found as components of the correlation matrices in Tables 1 and 2. Service as a nurse, traumatic military experiences, homecoming, postmilitary traumas, and posttraumatic stress disorder symptoms were endogenous variables posited to have been caused by the exogenous variables and historically antecedent endogenous variables.

No cases were required to be deleted as outliers. Logarithmic transformations were performed on conduct disorder, war trauma, sexual trauma, low help, and posttraumatic stress disorder, because their kurtosis could be made to approach normality more closely. The multivariate kurtosis[19] was substantially flatter than normal for each sample. Therefore, we selected generalized least squares for the method of model parameter estimation, which was performed by the CALIS procedure of the SAS software package.[20]

Statistically, the adequacy of a model can be judged from its fit and parsimony.[21,22] It is desirable to achieve a high degree of fit with the estimation of as few parameters as possible. This can be done

by reduction of a full model through specification of certain of its nonsignificant and weak paths as paths of zero magnitude. In this way, the reduced model may increase parsimony with only a minimal erosion of fit. We used the root mean square residual and the comparative fit index[22] as our indexes of fit and the consistent information criterion[23] and the parsimonious fit index[21] as our indexes of parsimony.

The analytic strategy was first to estimate the parameters of the full model for each sample. The results of this estimation were examined for similarities among the path coefficients and the total effects, which were then used as the basis for specifying a reduced model for both samples. Inspection of Table 3 reveals that the fit and parsimony of the full model were virtually the same for each sample. The root mean square residuals and comparative fit indexes indicate good fit, but the consistent information criteria and parsimonious fit indexes indicate that parsimony was relatively low. The reduced model achieved a substantial improvement in parsimony (consistent information criteria of −160 and −118 and parsimonious fit indexes of .529 and .488) over the full model, and there was only a slight erosion of fit (root mean square residuals of .061 and .073 and comparative fit indexes of .951 and .938). The reduced model, therefore, was preferred over the full model as a more streamlined representation of etiology.

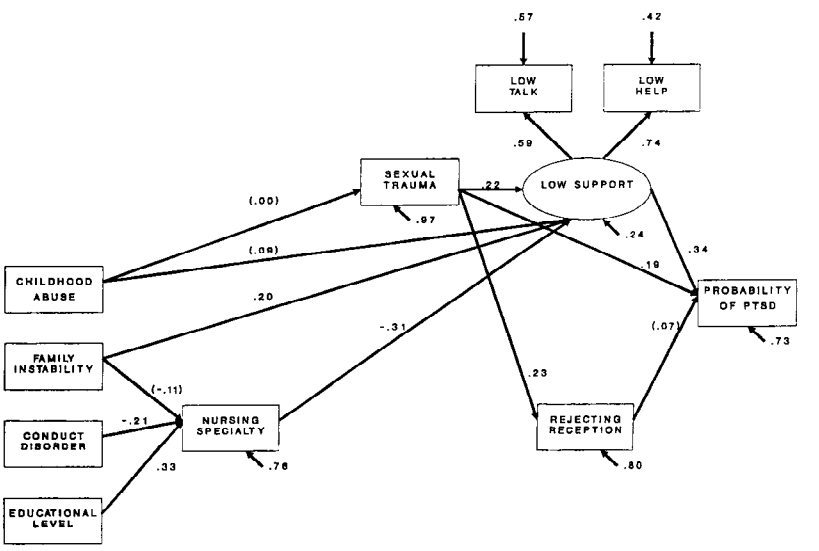

FIGURE 2—Etiological model for probability of posttraumatic stress disorder among Vietnam era women.

TABLE 4—Total Effects on the Probability of Posttraumatic Stress Disorder among Vietnam Theater and Vietnam Era Women as Specified in the Reduced Model

	Theater Women (n = 396)		Era Women (n = 250)	
	Effect	%	Effect	%
Childhood abuse	0.15	7.1	0.03	3.3
Family instability	0.03	1.4	0.08	8.7
Educational level	0.00	0.0	−0.03	−3.3
Conduct disorder	0.00	0.0	0.02	2.2
Nursing specialty	−0.03	−1.4	−0.10	−10.9
Sexual trauma	0.22	10.4	0.27	29.3
War trauma	0.26	12.3		
Low support	1.35	63.6	0.58	63.0
Rejecting reception	0.14	6.6	0.07	7.6
Total	2.12	100.0	0.92	100.0

Results

The full model was estimated separately for theater women ($\chi^2 = 33.02$, $df = 12$, $P < .001$) and era women ($\chi^2 = 21.51$, $df = 10$, $P < .02$). Premilitary marital separation and postmilitary sexual trauma were relatively minor and inconsequential contributors to posttraumatic stress disorder. Accordingly, these variables were dropped from the reduced model, as were some paths among the remaining variables that were consistently nonsignificant across the samples. The reduced model, therefore, was specified to consist of the paths common to both samples or noteworthy for one of the samples. The reduced model is diagrammed in Figure 1 for theater women ($\chi^2 = 63.55$, $df = 32$, $P < .001$) and in Figure 2 for era women ($\chi^2 = 45.19$, $df = 25$, $P < .01$). Nonsignificant path coefficients are denoted by parentheses.

One consideration in determining the relative contribution of different variables is the size and significance of the standardized regression (path) coefficients. A second consideration is the magnitude of the total effects accounted for by each variable. The total effect of one variable on another variable is the sum of the products of all regression coefficients along all of the paths between the first variable and the second variable.

Inspection of Table 4 shows that the allocation of total effects was quite similar across groups for several of the variables. Low support from family and friends at homecoming comprised 63.6% of the effects for Vietnam theater women and 63% of the effects for Vietnam era women. A rejecting reception by society accounted for 6.6% of the effects for theater women and 7.6% for era women. Trauma during the military contributed 22.7% of the effects for theater women and 29.3% of the effects for era women, the former being divided about equally between sexual (10.4%) and war (12.3%) trauma.

Discussion

War trauma and sexual trauma made approximately equal contributions to the probability of developing chronic posttraumatic stress disorder. The fact that sexual trauma was much less common than war trauma and yet was nearly as influential in terms of posttraumatic stress disorder attests to its pathogenic importance. For

Vietnam theater women, exposure to both war and sexual trauma appears to have influenced the amount of rejection experienced from society's reception at the time of homecoming. Many women have reported being criticized by civilians for participating in the war, and some women have blamed themselves for not being able to save more lives. Sensitivity to this societal and self-blame appears to have been more intense for those women who were exposed to more trauma.

With regard to sexual trauma, a common experience reported by female veterans upon homecoming was being stigmatized in stereotypic fashion as either whores or lesbians.[4,5] A common reaction among civilian women who have been raped is believing that other people view them as unchaste or as "bad" women.[24] It is understandable, therefore, that having been sexually assaulted and/or harassed in the military might well have heightened women's sensitivity to the stigmatization generated by societal stereotyping in general. It is noteworthy that the influence of sexual trauma on sensitivity to the homecoming reception was operative among Vietnam era as well as Vietnam theater women.

The supportiveness of the homecoming reception played a major mediational role between women's exposure to trauma and their development of posttraumatic stress disorder. This role is quite similar to that reported previously for men,[13] and it is reminiscent of an earlier finding that "psychological isolation" at the time of homecoming is the strongest single predictor of current posttraumatic stress disorder.[25] We view this mediational role to be that of a counterbalancing force[26] to the impact of the trauma. When the homecoming reception was unsupportive, women were deprived of this counterbalancing force and were thus left with only their individual psychological resources to cope with the adverse potential of their traumatic experiences.

More specifically, we have suggested elsewhere[13] that the homecoming is a critical event in determining whether acute stress reactions are either diminished to subclinical intensity or preserved undiminished to become recognized at some later point as posttraumatic stress disorder. Smith[27] and Parson,[28] among others, have identified the homecoming as a set of experiences that are crucial to the healing process for veterans. According to Smith, if the country does not sanction the war effort, veterans are deprived of a shared, consensual basis for affirming the meaningfulness, worth, and legitimacy of their behavior during the war. This prohibits the "sealing over" of the traumatic experiences whereby their immediate distressing potential is diffused and their eventual integration into each individual veteran's life is accomplished piecemeal over time. Veterans are thrown back upon their own individual consciences to reconcile their behavior in extraordinary circumstances with standards that are applicable to ordinary circumstances. Parson has described this type of homecoming as burdening veterans with "sanctuarial traumatic stress." He concludes: "I believe that the profound depth of narcissistic wounding in Vietnam veterans (i.e., the sanctuarial traumatic stress) is as centrally involved in long-term, life course problems as are the psychic aftereffects of combat stress."[28(p254)]

The model indicates further that low support is, to some extent, a function of a premilitary history of child abuse and family instability that women experienced in their formative years. It is likely that the limited support available from family and friends at homecoming is carried forward as typical of the level of support available in the ensuing years as well. The continued unavailability of support could be expected to perpetuate and reinforce entrenchment of posttraumatic stress disorder as a chronic condition. It is possible, however, that at least some of the association with posttraumatic stress disorder represents a lack of seeking support on the part of veterans due to the estrangement from others that is part of the disorder. Thus, the contribution of low support must be qualified to some extent by this possibility.

There are many similarities in the etiological picture for chronic posttraumatic stress disorder among women who served in a war zone and women who did not. In both groups, sexual traumatization in the military and lack of support from family and friends at the time of homecoming were the two major factors contributing significantly to the development of posttraumatic stress disorder. In addition, a rejecting societal reception and a history of child abuse had smaller but notable influences on the development of the disorder. As noted earlier, both war and sexual trauma led to lower support from family and friends and to a rejecting reception from society.

In both groups, greater family stability and less antisocial behavior contributed to women entering the military with nursing as their occupational specialty. Family stability may reflect higher aspirations and/or higher confidence instilled in children during their upbringing. Because nursing is a profession devoted to caring for others, people engaging in antisocial behavior would not seem to find that occupation appealing.

Among both theater and era women, being a nurse contributed to the availability of greater support from family and friends at the time of homecoming. This may be an effect of the fact that nursing is a profession devoted to the caring of others. It may well be that nurses, more than those in most other specialties, extend themselves to others in a warm, appealing manner and both encourage and reward others for being available and responsive to them.

The results of this study have several implications for institutional strategies for mitigating the development of chronic posttraumatic stress disorder. Current attempts at public education concerning the traumatizing effects of sexual harassment and abuse, as well as the legal sanctions against such behaviors, should continue and should be expanded as the primary public health approach to prevention. Public education not only heightens people's awareness of problematic behavior but also expresses society's condemnation of the behavior. When trauma occurs, however, treatment programs staffed by persons specially trained to deal with these issues should be readily available. It should be recognized that special efforts may be needed to encourage victims to avail themselves of help. Feelings of shame and stigmatization may keep them from seeking help, and these feelings may be exacerbated by negative attitudes of family and friends. Data presented here indicate that such negative attitudes may have deep roots in family history, and special interventions may be required to maximize or even mobilize support from these sources.

Before we conclude, it is important to acknowledge the limitations of this study. One is that even though events could be ordered unambiguously in terms of their historical occurrence, it is possible that a retrospective bias to reporting might have introduced connections among variables that may not have existed as they actually occurred. A second limitation is the omission of possibly important etiological factors. Some factors, such as a genetic predisposition,[29] could not be included because the information was not collected as part of the data set, an etiological role not being envisioned for

genetic factors at the time of the study. Other factors, such as postmilitary employment, marital adjustment, or substance abuse, could not be modeled because an equally strong case could be made for causation in either direction. A third limitation is that it is unknown to what extent selective factors influencing entry into the military might be operating to reduce generalizability to civilian women. Finally, the probability of posttraumatic stress disorder was quite small in this study, especially among Vietnam era women. If, as we suspect, there was an underreporting of sexual trauma, and consequently of posttraumatic stress disorder in response to such trauma, the strength of the relationship between sexual trauma and posttraumatic stress disorder may actually be substantially greater. The current results, then, would represent a conservative assessment of effect.

We believe that our model, taken as a whole, has its greatest value from two perspectives. First, it demonstrates that there is strong empirical support for an etiological role for both war trauma and sexual trauma in the development of chronic posttraumatic stress disorder among women veterans. Second, it provides a heuristic framework for progressively expanding the picture and filling in the missing pieces as more research findings and more conclusive data become available. □

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