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Factors Associated With Women's Risk of Rape in the Military Environment

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Background *Health hazards specific to women workers have not been adequately documented. This study assessed military environmental factors associated with rape occurring during military service, while controlling for pre-military trauma experiences.*
Methods *A national cross-sectional survey of 558 women veterans serving in Vietnam or in subsequent eras was obtained through structured telephone interviews.*
Results *Rape was reported by 28% ($n = 151$) of participants, with consistent rates found across eras. Military environmental factors were associated with increased likelihood of rape, including: sexual harassment allowed by officers ($P < 0.0001$), unwanted sexual advances on-duty ($P < 0.0001$) and in sleeping quarters ($P < 0.0001$).*
Conclusion *Violence towards military women has identifiable risk factors. Work and living environments where unwanted sexual behaviors occurred were associated with increased odds of rape. Officer leadership played an important role in the military environment and safety of women. Assailant alcohol and/or drug abuse at time of rape was notable. Interventions and policies based on modifiable environmental risk factors are needed to increase protection for women in the workplace.* Am. J. Ind. Med. 43:262–273, 2003. *Published 2003 Wiley-Liss, Inc.*†

KEY WORDS: workplace violence; women; rape; military

INTRODUCTION

Although women currently comprise almost half of America's workforce [United States Department of Labor, 1996], little is known about health hazards specific to women workers. Researchers have identified that a gender bias persists in medical research publications in general and in occupational health specifically. Not only are women studied less often than men, gender differences are infrequently investigated [Niedhammer et al., 2000]. Historically, research on the safety of working women initially focused on reproductive health and fetal safety while neglecting a broad range of potential workplace hazards [Stromberg et al., 1987; Bachman, 1996; Messing, 1997].

With women increasingly represented in the labor force, there is growing awareness that violence towards working women is commonplace and a significant occupational health concern. Women are twice as likely as men to be assaulted at work and experience a disproportionate share

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of assault-related injuries [Bureau of Labor Statistics, 1996; LaMar et al., 1998]. Female workplace deaths are significantly more often assault-related [Toscano, 1996], and rape is prevalent in the workplace, accounting for two-thirds of women's non-fatal victimizations [Kilpatrick et al., 1992]. Rape is a costly public health problem, resulting in the highest monetary cost per victim of non-fatal violent crimes, in terms of medical and mental health costs, work productivity losses, and impaired quality of life [Miller et al., 1993]. A growing literature indicates that women who have experienced violence suffer severe and chronic physical and emotional health effects. Higher levels of risky health behaviors, such as smoking, obesity, substance abuse, and high-risk sexual behaviors have been reported in victims of physical or sexual assault [Felitti, 1991; Koss et al., 1991; Springs and Friedrich, 1992]. Since women workers have comparatively lower wages and more limited health insurance benefits than men [Stellman, 1999], access to health care is an additional concern.

Despite the magnitude of the problem, little is known about predictors of workplace sexual violence. It is hypothesized that a combination of individual, relational, and situational factors contributes to the occurrence of violence within different types of work environments [Stellman, 1999]. As previously reported [Sadler et al., 2001], the risk of workplace harassment and assault appears to be heightened for women in male-dominated occupations [DeFleur, 1985; Kauppinen-Toropainen and Gruber, 1993; Rosenberg et al., 1993; Dekker and Barling, 1998; Frank et al., 1998; Haavio-Mannila et al., 1998]. This risk has been hypothesized to result from organizational cultures that value characteristics traditionally attributed to men and with attitudes that women are unsuitable for many roles because of the supposed need for physical strength and acceptance as an authority figure [DeFleur, 1985; Rosenberg et al., 1993; Dekker and Barling, 1998; Frank et al., 1998].

With more than one half million women serving in the Department of Defense (DoD) [Becraft, 1990; Department of Defense, 2000], military women constitute an occupational group potentially at increased risk of violence. Sexual assault during military service is frequently reported by women seeking care from The Department of Veterans Affairs (DVA) (23 to 29%) [Murdock and Nichol, 1995; Coyle et al., 1996; Hankin et al., 1999]. Health related consequences of physical and sexual violence [Sadler et al., 2000], and risk factors for women's non-fatal assaults have previously been reported [Sadler et al., 2001]. Women veterans provide an opportunity to investigate the environmental circumstances and risk factors associated with sexual violence in the workplace.

The goal of this exploratory study was to describe characteristics of rape victims and perpetrators and to attempt to identify workplace environmental factors associated with rape occurring during military service. Since childhood or adult sexual violence prior to enlistment predispose women to repeated violence [Walker et al., 1999], we controlled for these factors in the analyses. Identifying and determining the relative importance of factors that promote and maintain violence towards women in the worksite may lead to the development of optimal interventions and policies to decrease the level of risk, and increase protection for women in the workplace.

METHODS

Cohort selection has been previously described [Sadler et al., 2000, 2001] but we summarize it here for the reader's convenience. A historical cohort of women veterans who served in the Vietnam (February 28, 1961 to May 7, 1975); post-Vietnam (May 8, 1975 to August 1, 1990); and the Persian Gulf (August 2, 1990 to present) eras was selected from the Department of Veterans Affairs (DVA) comprehensive women's health care centers' registries ($N = 8693$). Random samples were selected ($N = 2172$) within region and era of service strata.

An introductory letter, information summary, and consent form approved by the Institutional Review Boards (IRB) of the University of Iowa and DoD were sent to all subjects with postage-paid preaddressed return envelopes. Mailings were distributed over a 6 month period (September 1996 to March 1997) to minimize lag between consent and participation. Follow-up letters were mailed to non-responders approximately 6 weeks after initial contact.

Computer-assisted telephone interviews by the University of Iowa Social Science Institute (Iowa City, Iowa) were scheduled with subjects who returned signed consent forms. Interviewers were women specifically trained for this project; their performance and data quality was monitored. From November 1996 through May 1997, 558 subjects completed interviews and were compensated financially ($40.00) for the time required to participate.

Comparison of Non-Responders and Participants

A random sample of 200 non-responders was selected and compared to participants with information obtained from the DVA decentralized electronic databases (Austin, TX). Participants differed from non-responders ($N = 200$) in age (40.3 vs. 37.7 years; $P < 0.003$); earlier military entry (18.0 vs. 15.0 years prior; $P < 0.001$); and time since discharge (12.0 vs. 10.0 years; $P < 0.001$). There were no differences with regards to branch of service, marital status, or service-connected disability for medical or for psychiatric disorders.

Fifty of the non-responders were interviewed by telephone, using a brief questionnaire to determine their reasons for not participating and to obtain general health

self-appraisals. These non-responders had received the mailed information but gave several reasons for not participating, which included being too busy (50%); belief that the topic (sexual victimization) did not relate to their military experience (50%); or that the topic was too close to their military experiences (32%); and fear that the interview would bring back bad memories (29%).

Structured Interview Design

A structured interview was developed to determine sociodemographic and environmental factors associated with gender-based violence in the military and its consequences. Items regarding types of violence exposures and accepted definitions were obtained from published surveys. Interview development was guided by the National Academy of Sciences four-stage process of quantitative risk assessment: hazard identification, exposure assessment, stages of dose-response models, and risk characterization [Wartenberg and Simon, 1995]. The interview originated from a self-report survey developed with a focus group of women veterans who were either employed by the VAMC or belonged to a local veterans group. After revisions and IRB approval, a pilot survey of 333 women identified in the women's registry of the Iowa City VAMC was performed. Parameters examined by this survey included occurrence and characteristics of violence; work, living, and leisure environments; officer conduct toward women; work performance, and health-care access. Respondents rated how often a series of statements of their military experiences were generally true, on a Likert-type scale from 1 ''never'' to 5 ''almost always.'' The military environment is a unique situation in which work and living quarters are located together, so rape occurring on and off-duty were considered as potentially work-related when on base or when the perpetrator was a ranking officer. This approach is based conceptually on the model of work-related violence as incidents that arise out of employment [Bulatao and VandenBos, 1996]. Chronbach's alpha was performed to assess the internal consistency of survey items specific to the military environment, and equaled 0.91 for the scale.

Operational Definitions

The legal definition of *rape* used, was that adopted by The American Medical Association (AMA) and The American College of Obstetrician's and Gynecologists (ACOG) and is commonly used in sexual violence research [American Medical Association, 1995; American College of Obstetricians and Gynecologists, 1998]; it is defined as any act that occurred without an individual's consent, which involved the use or threat of force, and included attempted or completed sexual penetration of the victim's vagina, mouth or rectum. *Sexual harassment* was defined to include quid pro quo demands and hostile environments. *Hostile environments* included unwanted and uninvited: sexual teasing, jokes, remarks, or questions, pressure for dates, sexually suggestive looks, gestures, letters, or other sexual attention, including unwanted sexual contact. *Unwanted sexual contact* was defined as unwanted intentional sexual touching or fondling of buttocks, thigh, leg, breasts, genitals, or other body part (independent of rape). The term ''*sexualized environment*'' indicates a hostile work setting. Experience with harassment was queried both in a series of questions about specific incidents and dichotomously regarding the participant's entire military tenure. These followed the US Merit System Protection and The Department of Defense 1995 Sexual Harassment Survey definitions of harassment [United States Merit System and Protection Board, 1988; Bastian and Lancaster, 1996].

The National Criminal Victimization Survey defines *non-fatal physical assault* as being pushed, shoved, grabbed, slapped, kicked, beaten, choked, threatened, or attacked with a weapon or other object (independent of rape or domestic violence events). Occurrence of physical assault was queried in the context of workplace victimization, not military duties inherently involving violence. The definition of *domestic violence* was adapted from ACOG diagnostic guidelines as physical assault initiated by a spouse or intimate partner [American College of Obstetricians and Gynecologists, 1995]. *Pre-military rape and domestic violence* were defined as above, but occurring in adulthood prior to enlistment. Experiences of *childhood physical or sexual abuse* were individually queried as experiences the participant may have had before 18 years of age using items from the 28-item short form of the Childhood Trauma Questionnaire [Bernstein et al., 1994]. *No victimization* indicated no experience of rape during military service. A *ranking officer* is one with a higher rank than the servicewoman and can be either a commissioned or non-commissioned officer.

Statistical Analysis

Responders were classified as those who experienced rape during their military service, and those who did not. Characteristics of rape occurring in a military environment were assessed. Bivariate logistic regression analyses were performed to examine separate risk factors for rape. Odds ratios and their corresponding 95% confidence intervals were calculated for the association between each independent variable and the outcome. All statistical analyses were performed using STATA [STATA Software Corporation, 1999] to account for the complex sample survey. Alpha was set at 0.05, and all *P*-values are two-tailed.

Logistic regression was used to examine independent risk factors for rape. Initial regression models considered all hypothesized individual factors. Variables significantly

associated with rape at a bivariate level were grouped into four categories of theoretically related factors, including: *enlistment*, *workplace environment*, *off-duty on-base environment*, and *ranking officer behavior.* Intermediate logistic regression models were built for each group of related variables. A final model was developed which included all intermediate model variables associated with the outcome at alpha less than 0.05. Model fit, calibration, scaling, and confounding were assessed.

RESULTS

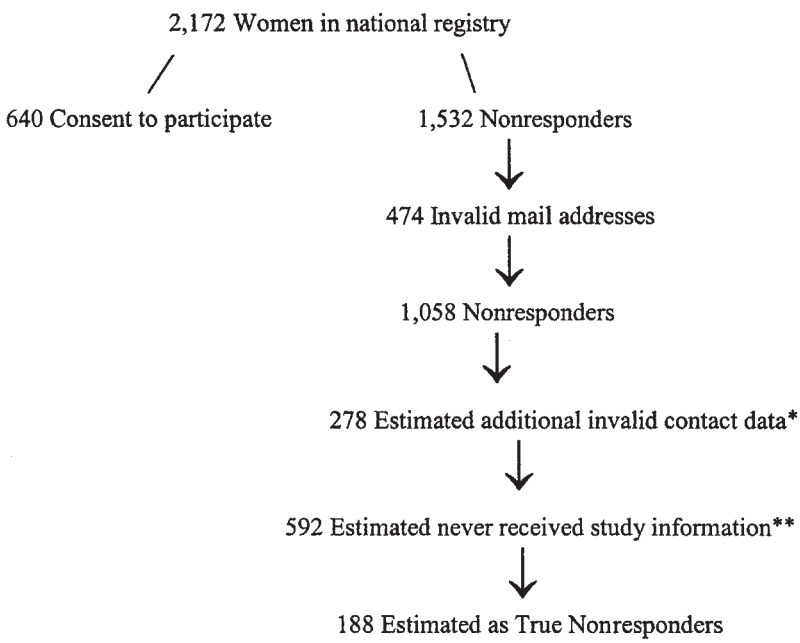
Six hundred and forty women consented to participate. Details of the estimated response rate have been previously reported [Sadler et al., 2000, 2001] and are summarized in Figure 1. Many veterans in the initial sample never received the introductory mailing, thereby, significantly impacting on the participation rate. A projected response rate of 77% provides an upper boundary for the actual response rate and a likely more accurate estimate. Due to funding limitations, the first 558 of 640 consenting women were interviewed. Complete interview data specific to these analyses were available for 506 subjects.

Description of Participants

The average age of participants in the sample was 40 years (±9 years, range = 20–83). The majority of respondents were white (74%, n = 374), one-third (n = 167) were married at the time of the interview (34%, n = 172), and 29% (n = 147 had never been married. Participants were well educated with over half completing technical school or some college education (54%, n = 273) and 30% (n = 152) completed college or had higher educational degrees.

All branches of the armed forces were represented; the majority of respondents served in the Army (49%, n = 248), followed by Air Force (23%, n = 116) and Navy (22%, n = 111). Ten percent (n = 51) of participants held officer rank. Ninety-nine subjects (19%) served in a combat zone, 30% (n = 152) served in a field unit, and 7% (n = 39) served on sea duty.

Many of the women interviewed (66%, n = 334) had a service-connected disability (SCD); 49% (n = 248) had a medical SCD; 7% (n = 35) had a psychiatric SCD; and 10% (n = 51) had both a medical and a psychiatric SCD. Half the participants (n = 253) were privately insured and the rest used Medicare (12%, n = 61), Medicaid (7%, n = 35), or other coverage, including veterans benefits (31%, n = 157).



48 of 183 (26%) attempted phone contacts revealed invalid current phone number

***28 of 50 (56%) of potential participants interviewed by telephone never received mailed study information.*

FIGURE 1. Estimated response rate.

Only 42% (n = 213) received all of their health care through Veterans Affairs, 37% (n = 187) received some, and 21% (n = 106) received none.

Violence Exposures During and Prior to Military Service

More than three-fourths (79%, n = 399) of participants reported experiences of sexual harassment during their military service. More than half (54%, n = 273) reported unwanted sexual contact. One-third (30%, n = 151) experienced one or more completed or attempted rapes. This is the group that will be the focus of further statistical analyses. Attempted rape solely was reported by 9% (n = 46), completed rape solely by 8% (n = 41), and separate incidents of attempted and completed rape by 13% (n = 64). Repeated rape was common. Over one- third of the women acknowledging rape during military service (37%, n = 56)) had experienced it at least twice. Fourteen percent (n = 21) of those raped reported that they had been gang-raped.

Pre-military victimization, a risk factor for repeated violence, was also assessed. Twelve percent (n = 61) of all respondents experienced rape solely during their military service; and one-fourth (25%, n = 126) experienced sexual violence only during their childhood. Fourteen percent of respondents experienced sexual violence both prior to and during military service.

Self-Defensive Behaviors of Military Women

A wide range of defensive behaviors were reported by all participants. Many women behaved in ways that made themselves less noticeable, such as being less friendly, and not looking people in the eyes (41%, n = 208), or deliberately making themselves look more masculine or unattractive (28%, n = 142). Others socialized only with groups of women (36%) or became involved in a relationship with a male (27%, n = 137) so they would feel safer or believed that they would be less likely to be sexually harassed. Concern about safety from violence was prevalent. One fourth of women (25%, n = 127) reported that they were armed or ready for self-defense on base due to their fear of rape, violence, or sexual harassment. Some women moved off base at some time during their military service because they wanted to feel safer from the threat of physical or sexual violence (13%, n = 66); or because they wanted to have leisure time without being sexually harassed (22%, n = 111).

Sociodemographic Differences Between Women Who Were Raped and Non-Victims

Women who were raped during military service were compared to women who were not; they entered the military at younger ages (20.7 vs. 22.5 years of age, $P < 0.0006$), were discharged at younger ages (26.3 vs. 29.1 years of age, $P < 0.001$), were more likely to be enlisted rank ($P < 0.005$; 95.2 vs. 84.5%), and were less likely to have completed college ($P < 0.01$; 18.3 vs. 33.9%). Women who were raped reported they voluntarily left military careers earlier than they had intended more often than non-victimized peers ($P < 0.0001$). No significant differences in age at interview, race, marital status, branch of service, or length of continuous military service were found between women who were raped during military service and non-victimized peers.

Characteristics of Rape Perpetrators

As in a previous report of physical non-fatal assault in military women [Sadler et al., 2001], the characteristics of the assailant and the situational factors are similar to those of women who were raped. Rape perpetrators were frequently identified as male, non-commissioned officers, and peers of similar rank (Table I). The assailant was often identified as someone who had sexually harassed the victim, frequently a non-commissioned officer, and someone under the influence of drugs or alcohol. The perpetrator was most frequently identified as of black or white race and less frequently identified to be Hispanic, Asian, Native American, or other races.

Situational Factors and Rape

Rape occurred more frequently on base and off-duty (Table I). The time of day most often reported for rape occurrence was 6 pm to midnight. Barracks were commonly identified as the location of rape.

Medical and Military Actions Taken by Women Following Rape

Victimized women reported adverse physical (58%) and emotional (78%) health effects of rape with almost a third seeking medical attention and one-fifth emotional counseling (see Table II). Three-fourths of women who were raped did not report the incident to a ranking officer. Of these, one-third noted they didn't report the assault because they were uncertain how to; one fifth didn't report because they believed that rape was to be expected in the military.

The role of ranking officers as perpetrators in some cases also affected victim's ability to report. One fourth of victims indicated they did not file a report because the rapist was the ranking officer. One third did not report rape because the rapist was a friend of the ranking officer. Most victims acknowledged a sense of shame, futility, or fear of the possible negative effects of officially reporting rape. These women believed that nothing would be done, reporting would

TABLE I. Characteristics of Rape Occurring During Military Service (N = 151)

Rape occurrence	N	% of victims
Off-duty	130	81.9
In continental USA	112	74.0
On-base	102	70.9
Off-base	80	53.0
Barracks/sleeping quarters on base	69	51.7
On-duty	44	36.6
During a temporary duty assignment	39	31.5
Victim under influence of alcohol/drugs at time of rape	41	26.8
During a training assignment	28	21.4
Time of day of rape		
6:00 pm–midnight	91	60.2
Midnight–7:00 am	42	24.2
Noon–6:00 pm	25	17.9
7:00 am–noon	10	3.4
Race/ethnicity of victim		
White	122	65.5
Black	31	26.9
Hispanic	14	3.7
Asian	11	2.8
Other combined	8	0.92
Rape perpetrator		
Male	146	98.3
Noncommissioned officer (NCO)	92	70.1
Someone who had sexually harassed	86	62.8
Peer of same/similar rank	76	53.3
Under influence of alcohol/drugs at time of rape	79	52.5
Superior in the chain of command (ranking officer)	53	40.7
A date	41	30.4
Someone of lower rank	26	20.4
Commissioned officer	28	18.2
Spouse/significant relationship	19	17.5
Immediate supervisor	25	16.3
Civilian off base	17	13.9
Training instructor	18	10.2
Military health care provider	11	10.1
Female	9	6.5
Civilian employee on base	5	5.2
Chaplain/military clergy	1	0.3
Race/ethnicity of perpetrator		
Black	78	59.9
White	97	58.9
Hispanic	19	21.0
Other combined	13	11.2
Joint frequencies		
Off duty and on base	86	56.2
Off-duty and in sleeping quarters	61	41.2
In sleeping quarters and NCO perpetrator	50	41.0
In sleeping quarters and peer perpetrator	40	31.0
Between 6 pm and midnight and off-duty	83	51.4
Between 6 pm and midnight and on duty	23	18.3
Between 6 pm and midnight and in sleeping quarters	41	31.8
Off duty and drug and alcohol abuse by perpetrator	72	47.5
On duty and drug and alcohol use by perpetrator	22	14.6
Someone who had sexually harassed and NCO	61	48.2

Note: Because of repeated victimization, response choices are not mutually exclusive and percentages do not add up to one hundred percent. Percentages are generated by STATA to account for the complex sampling design.

make the work situation worse, or their military careers would be adversely affected.

Relationship Between Pre-Military Violence Exposures and Rape During Military

The associations of rape during military service with enlistment and military environmental risk factors are shown in Table III. Women who joined the military at age 19 years or younger, who were of enlisted rank, or who experienced childhood physical or sexual violence or rape prior to service were at least twice as likely to experience rape during their military service. Domestic violence prior to enlistment, or enlistment to escape an abusive home life was not significantly associated with rape during military service.

TABLE II. Actions Taken by Women in Response to Rape Occurring During Military Service

Actions taken by women in response to rape (n = 151)	% (n)
Health-related action	
Saw a medical doctor	30.6 (45)
Sought emotional counseling	21.5 (38)
Military action	
Obtained a military discharge	11.8 (22)
Asked for a transfer	22.3 (37)
Formally reported rape	26.3 (44)
Deterrants to officially reporting rape (n = 107)	
Did not know how to formally report	32.9 (43)
Person to report to was the rapist	24.7 (21)
Person to report to was a friend of the rapist	33.4 (41)
Thought rape an expected part of military service	19.2 (26)
Too embarrassed or ashamed to report	76.9 (86)
Thought report would negatively impact career	78.7 (81)
Did not think anything would be done	69.1 (76)
Thought would be blamed by coworkers	60.2 (59)
Thought would make things worse	78.7 (76)

Relationship Between the Military Environment and Rape During the Military

Women exposed to harassment or violence during their military career also were more likely to experience rape. Sexually harassed women or those who experienced unwanted sexual contact during military service had significantly elevated odds of in-military rape. Physically assaulted women were twice as likely to experience rape during military service. Risk factors for rape included both on-duty and off-duty on-base settings.

Women reporting hostile work environments had approximately six-fold greater odds of rape. Being quartered in mixed gender barracks in and of itself was not significantly associated with the odds of rape. However, experiencing unwanted sexual advances, remarks, or pressure for dates in sleeping quarters was associated with more than a three-fold increase in odds of rape. Women who observed sexual activities of others in military sleeping quarters experienced a three-fold increase in odds of rape.

Ranking officer or immediate supervisor behaviors were strongly associated with women's frequency of rape. When officers engaged in quid pro quo behaviors, women reported a five-fold increase in rape. Officers allowing or initiating sexually demeaning comments or gestures towards female soldiers was associated with a three to four-fold increase in likelihood of rape.

Logistic Regression Models of Risk Factors for Rape

Separate multivariate logistic regression models analyzing enlistment and military environmental exposures for rape occurring during military service were developed (Table IV). Enlistment factors independently associated with rape were military enlistment at $\leq$19 years of age ($P < 0.05$), and experiencing rape in adulthood prior to military entry ($P < 0.05$). The one workplace environment independent risk factor identified was the on-duty experience of physical intimidation or believing oneself unsafe because of the number of male soldiers in work area ($P < 0.05$). Several off-duty and on-base environmental factors were associated with rape: lack of places for leisure where safe from assault ($P < 0.05$); observing homosexual or heterosexual sexual activities in sleeping quarters (respectively, $P < 0.05$; $P < 0.01$); and unwanted sexual advances, remarks, or pressure for dates in sleeping quarters ($P < 0.01$). The occurrence of the ranking officer allowing others in the unit to make sexually demeaning comments or gestures in the service woman's presence ($P < 0.01$) was the sole officer factor independently associated with rape during military service.

The final model of risk factors for rape during military service (Table V) included all intermediate model variables associated with the rape at alpha less than 0.05, identified both enlistment and environmental exposures, including: military enlistment $\leq$19 years of age ($P < 0.05$), rape in adulthood prior to military entry ($P < 0.05$); the on-duty experience of physical intimidation or believing oneself unsafe because of the number of male soldiers in work area ($P < 0.05$); observing heterosexual sexual activities in sleeping quarters ($P < 0.05$); and, the ranking officer allowing others in the unit to make sexually demeaning comments or gesture in the service woman's presence ($P < 0.05$).

Relationship Between Era of Service and Rape

We found significant differences in the characteristics of the reported military environment by era of service of the respondent. The most dramatic recent change in the military environment was the shift to shared sleeping quarters. More than half of Persian Gulf War (PGW, the most recent era of service) veterans (53%) reported sharing sleeping quarters with both men and women, whereas only one-third of earlier veterans (37%) had done so ($P < 0.006$). Attitudes of PGW veterans were different from women serving previously in that they did not believe that rape is an expected part of military life ($P < 0.019$).

The relationship between rape and the military environment was assessed by era of service. Logistic regression models considered a variable identifying a PGW veteran, as well as interaction terms for all other variables with the PGW era variable. Although no significant difference in occurrence of rape was found between eras of service: Vietnam (24%, n = 202), Post-Vietnam (30%, n = 365), Persian Gulf War (23%, n = 210), we examined whether the relationship between the military environment and risk of rape identified for the whole sample was consistent for recent veterans. The main effect for the PGW-era in logistic models with appropriate interaction terms was not significant, indicating that the odds of rape were not associated with the PGW-era, after controlling for other relevant variables, despite potential changes in the military environment.

However, two interaction terms were significant, indicating that the associations of these variables with rape differed for those of the PGW-era compared to women from earlier eras. Observation of heterosexual sexual behavior in the sleeping quarters was associated with nearly three-fold increased odds of rape (OR = 3.0). However, for PGW-era veterans, this variable was associated with more than a four-fold increase in the odds of rape (4.6 for PGW vs. 2.7 for prior eras). For a respondent to be one of the first women to perform a traditionally male job, nearly doubled the odds of rape (OR = 1.9) overall. However, for PGW-era veterans, being one of the first women to perform a traditionally male job was associated with lower odds of rape (0.75 for PGW vs. 3.0 for prior eras).

TABLE III. Description of Enlistment, Military Violence, and Military Environmental Factors and the Odds Ratios Comparing These Individual Factors in Women Raped During Military Service With Those Who Were Not*(N = 506)

Risk factor	Odds ratios (CI_{95})	Rape (n = 151)	No. rape (n = 355)	*P* value
Enlistment factors				
Enlistment at ≤19 years of age	1.97 (1.16–3.34)	54.5 (86)	37.8 (140)	0.0123
Enlisted rank	3.64 (1.38–9.58)	95.2 (143)	84.5 (312)	0.0090
Childhood physical abuse	1.88 (1.12–3.15)	46.1 (73)	31.3 (115)	0.0178
Childhood sexual abuse	2.38 (1.40–4.03)	48.7 (74)	28.6 (107)	0.0013
Rape prior to military	2.57 (1.49–4.46)	40.0 (58)	20.6 (79)	0.0008
Domestic violence prior to military	0.92 (0.48–1.76)	17.6 (33)	18.9 (69)	0.7938
Enlisted to escape abusive home life	1.69 (0.99–2.88)	41.8 (63)	29.9 (111)	0.0539
Military violence				
Sexual harassment	15.21 (5.32–43.51)	97.5 (145)	71.5 (247)	0.0001
Unwanted sexual contact	7.68 (4.39–13.42)	84.6 (125)	41.7 (153)	0.0000
Physical assault	1.98 (1.11–3.55)	32.6 (47)	19.6 (73)	0.0211
Workplace environment				
Sexually demeaning comments, behaviors, or pornography at duty station	3.75 (1.85–7.61)	83.6 (127)	57.7 (204)	0.0003
Unwanted sexual advances, sexual remarks, or pressure for dates on-duty	5.58 (2.63–11.41)	86.5 (129)	54.0 (181)	0.0001
While service woman on-duty, soldiers stared at their body	4.91 (2.54–9.50)	88.2 (125)	60.3 (200)	0.0001
As a female performing military job, put at greater risk of uninvited sexual teasing, remarks, jokes, or pressure for dates than males working same job	3.81 (2.00–7.25)	80.2 (122)	51.5 (181)	0.0001
On-duty, observed non-combat-related violence among military personnel	2.10 (1.24–3.57)	43.1 (65)	26.5 (88)	0.0062
One of the first women in assigned unit to perform a traditionally male job	1.92 (1.14–3.22)	62.8 (71)	46.8 (175)	0.0139
Work group all male or more men than women	2.12 (1.12–3.99)	85.0 (125)	72.8 (259)	0.0208
Off-duty on-base environment				
Shared sleeping quarters with both men and women	1.03 (0.62–1.73)	43.3 (62)	42.6 (150)	0.9056
Observed heterosexual sexual activities in sleeping quarters	3.03 (1.79–5.14)	56.2 (79)	29.7 (102)	0.0000
Observed homosexual sexual activities in sleeping quarters	2.92 (1.60–5.31)	34.3 (50)	15.2 (46)	0.0005
Experienced unwanted sexual advancements, sexual remarks, or pressure for dates in sleeping quarters	3.73 (2.18–6.37)	50.6 (62)	21.6 (69)	0.0000
Felt physically intimidated or unsafe because of the number of male soldiers or personnel around you	3.74 (2.19–6.39)	57.7 (86)	26.7 (97)	0.0000
Were places on base to go for leisure without fear of assault or harassment	0.38 (0.23–0.65)	50.7 (62)	72.8 (240)	0.0004
Ranking officer behavior				
Ranking officer/immediate supervisor asked the service women to perform sex-role stereotypic jobs in addition to regular work assignments	1.78 (1.06–2.98)	46.5 (78)	32.8 (106)	0.0286
Ranking officer/immediate supervisor made sexually demeaning comments or gestures to the service woman	3.54 (2.06–6.06)	61.2 (82)	30.8 (94)	0.0000
Ranking officer/immediate supervisor allowed others in unit to make sexually demeaning comments or gestures in the service woman's presence	3.94 (2.30–6.76)	63.3 (91)	30.4 (105)	0.0000
Threatened or charged with a formal military discipline because refused orders that put in places of risk because of gender	4.17 (1.98–8.76)	24.7 (39)	7.3 (24)	0.0002
Threatened with formal military disciplinary action because refused to perform sexual acts	2.83 (.83–9.70)	33.7 (20)	15.2 (7)	0.0958
Ranking officer/immediate supervisor offered exchange of sex for privileges or promotion	5.38 (2.61–11.07)	26.3 (39)	6.2 (21)	0.0000

Note: If the confidence interval does not include one, the difference between women physically assaulted during military service and women who were not assaulted is statistically significant ($P < 0.05$).

*Rates are generated by STATA to account for the complex sampling design. They are not adjusted for covariates.

DISCUSSION

Personal safety is an important occupational health issue for military women. Our study demonstrates that military environmental factors were strongly associated with women's risk of rape during military service, even when considered in the context of established risk factors for violence, such as prior victimization and younger age.

TABLE IV. Logistic Regression Models for Rape during Military Violence*

	Models[a]			
	(1) Enlistment model	(2) Workplace model	(3) Off-duty on-base model	(4) Ranking officer model
Enlistment factors				
Military enlistment ≤19 years	1.74[b] (1.00–3.02)			
Childhood physical abuse	1.14 (0.61–2.11)			
Childhood sexual abuse	1.46 (0.73–2.96)			
Victim of rape before entering the military	1.99[b] (1.09–3.65)			
Enlisted personnel	2.60 (0.94–7.19)			
Workplace environment factors				
Sexually demeaning comments, behaviors, or pornography at duty station		0.94 (0.37–2.38)		
On-duty unwanted sexual advances, sexual remarks, or pressure for dates		2.47 (0.94–6.52)		
While service woman on-duty, soldiers stared at their body		1.90 (0.84–4.31)		
As a female performing military job, put at greater risk of uninvited sexual teasing, remarks, jokes, or pressure for dates than males working same job		1.66 (0.78–3.55)		
On-duty experience of physical intimidation or believed unsafe because of the number of male soldiers in work area		2.05[b] (1.09–3.83)		
On-duty observation of non-combat related violence among military personnel		1.04 (0.55–1.96)		
One of the first women in assigned unit to perform a traditionally male job		1.45 (0.83–2.53)		
Work group all male or more men than women		0.90 (0.42–1.93)		
Off-duty on-base environment factors				
Places available for leisure without fear of assault or harassment			0.50[b] (0.29–0.87)	
Shared sleeping quarters or barracks with both men and women				
Observed homosexual sexual activities in sleeping quarters			2.03[b] (1.01–4.07)	
Observed heterosexual sexual activities in sleeping quarters			2.35[c] (1.33–4.15)	
Experienced unwanted sexual advances, sexual remarks, or pressure for dates in sleeping quarters			2.21[b] (1.22–4.01)	
Ranking officer behaviors				
Ranking officer made sexually demeaning comments or gestures to the service woman				1.60 (0.75–3.44)
Ranking officer allowed others in unit to make sexually demeaning comments or gestures in the service woman's presence				2.53[b] (1.24–5.17)
Threatened or charged with formal disciplinary action because refused to follow orders that put at risk because of gender				1.81 (0.76–4.34)
Ranking officer threatened with formal military disciplinary action because refused to perform sexual acts				2.02 (0.50–8.19)
Ranking officer told service woman she could exchange sex for privilege or promotion				1.80 (0.76–4.26)
Ranking officer expected to perform sex-role stereotypic jobs in addition to usual job assignments				0.68 (0.33–1.41)

All factors included in this table had a significant bivariate odds ratio when modeled solely with the dependent variable.
*Logistic regression parameter estimates are shown. Rates are generated by STATA to account for the complex sampling design.
[a]Models are presented with parameter estimates/odds ratios (confidence interval 95%).
[b]$P < 0.05$.
[c]$P < 0.01$.

Consistent rates of rape across eras of service indicate that violence towards military women remains an unresolved problem.

Young women entering male-dominated work groups at lower levels of authority are those most likely to be harassed in organizations. Indeed, much of literature on workplace violence examines victim characteristics. The increased risk of rape found in younger workers [Alexander et al., 1994; Klein et al., 1997] and women who have experienced prior adult or childhood victimization [Wyatt et al., 1992;

TABLE V. Logistic Regression Final Model for Rape During Military Violence*

Factors	Final Model[a]
Enlistment factors	
Military enlistment ≤19 years	1.82[b] (1.02–3.25)
Victim of rape before entering the military	2.33[c] (1.37–3.96)
Workplace environment factors	
On-duty experience of physical intimidation or believed unsafe because of the number of male soldiers in work area	2.24[b] (1.17–4.31)
Off-duty on-base environment factors	
Places available for leisure without fear of assault or harassment	0.67 (0.37–1.22)
Observed homosexual sexual activities in sleeping quarters	2.01 (0.97–4.16)
Observed heterosexual sexual activities in sleeping quarters	2.13[b] (1.16–3.93)
Experienced unwanted sexual advances, sexual remarks, or pressure for dates in sleeping quarters	1.31 (0.70–2.44)
Ranking officer behaviors	
Ranking officer allowed others in unit to make sexually demeaning comments or gestures in the service woman's presence	1.93[b] (1.02–3.65)

All factors included in this table had significant bivariate odds ratios, both when modeled solely with the dependent variable and subsequently in multivariate logistic regression models analyzing exposures for rape occurring during military service (Table IV). Rates are generated by STATA to account for the complex sampling design.
*Logistic regression parameter estimates are shown.
[a]Models are presented with parameter estimates/odds ratios (confidence interval 95%).
[b]$P < 0.05$.
[c]$P < 0.01$.

Walker et al., 1999] are consistent with the results of our study.

Conversely, far less research has been conducted on factors in the workplace environment that are associated with violence. Our results demonstrate that women had significantly elevated odds of rape when the living or work environments were sexualized. These findings indicate that work environments that allow inappropriate sexual conduct, however subtle, can significantly increase women's risk of rape, suggesting a continuum of violence, with rape the most severe form of coercion. Moreover, rape occurred most frequently on base and off-duty. Sleeping quarters were high-risk locations for rape, suggesting an environment in which the perpetrator has easier access. Notably, more than half of veterans of PGW era women reported sharing sleeping quarters with both men and women. Studies of civilian workers have also found that late evening to early morning are high-risk hours for rape, which has been attributed to isolation from fellow employees and the public [Alexander et al., 1994].

Our results indicate that the leadership behaviors of officers are a powerful risk factor for violence towards servicewomen. Behaviors included officers making sexually demeaning comments or gestures, thus providing an implicit sexualized environment. The elevated risk of rape in barracks where sexual activities were observed appears to demonstrate this. Our findings support prior research indicating that military women frequently identify military personnel of higher rank/grade as perpetrators of unwanted sexual attention [Martindale, 1990], and that this sexual harassment is associated with adverse conduct of fellow soldiers toward the female soldier [Martindale, 1990; Bastian and Lancaster, 1996]. Other studies of university employees have found that sexual harassment is more likely if male employees perceive that their employer is unwilling to deal seriously with sexual harassment complaints [Warren et al., 1999].

Our findings also demonstrate the key role of leadership or supervisory behavior in contributing to an environment that tolerates or even encourages behaviors that directly or eventually result in sexual violence towards military women. Conversely, it is important to note that officer or supervisory conduct can promote a healthy work environment for women. Interventions with the training and supervision of officers are clearly indicated by these findings. Logical interventions would be greater oversight and accountability for behaviors in the day-to-day workplace and barracks. Sexually demeaning conduct should not be tolerated and the occurrence of such misconduct should result in demonstrable disciplinary action.

There were a number of adverse workplace implications in this study. Almost one third of military women reported that they did not know how to report a rape formally and only 26% of rape victims formally reported their rape to a superior officer, thus increasing the likelihood of violence continuing. In the civilian workplace, only 16 to 53% of rapes are reported to the authorities [Bachman, 1996]. Employee retention was affected in that a substantial number of women who were raped either left the military (12%) or requested a transfer (22%). It is unclear how many civilian women quit their jobs following rape, but a review of workplace harassment revealed that about 10% of women who experience sexual harassment leave their jobs either because of

frustration, being fired, transferred, or reassigned [Gutek and Koss, 1993]. Simultaneous with primary prevention interventions, the development of new channels for reporting sexual assault appear necessary so that victims can report without fear of retribution. Our findings indicate that victimized women were more likely to seek medical attention than to formally report their victimization or seek psychological counseling. This indicates that an important intervention is the education of military health care providers about how to appropriately screen female soldiers for trauma experiences as an integral aspect of routine patient examinations.

Our findings are consistent with other research. More than a quarter of victims and over half of assailants were noted to be under the influence of drugs or alcohol at time of the rape. Alcohol use by offenders or victims has been found to be present in approximately one-third to two-thirds of rape incidents, with the risk of sexual assault potentially greater when both are drinking [Brecklin and Ullman, 2001]. In a recent review of violence research, alcohol consumption by the perpetrator was a consistent predictor of violence towards women [Bennett and Lehman, 1996]. Other researchers have found that drinking contributed to workplace antagonism and violence beyond the influence of demographics, setting, or stress factors [Koss, 1990]. Even though our research was not intended or designed to investigate prevalence estimates of violence against women veterans, the rates of violence are similar to those described in military and civilian populations. The rate of rape found in our research (28%) is similar to that of other studies of women veterans reported by Hankin et al. [1999] (23%), and Murdock and Nichol [1995] (25% of women age 50 or younger), and Coyle et al. [1996] (29%).

Nearly half of our participants had experienced childhood sexual abuse, rape, or both before military service. This is consistent with findings by Koss [1990], who estimated that 38–67% of adult women recall sexual assault during childhood or adolescence. A lower rate of childhood sexual abuse (27%) was found in a national survey of adult civilian females [Finkelhor et al., 1990]. Compared with recent studies of active-duty military women, our rates of childhood sexual victimization (35%) fell within the reported range (25–50%) [Rosen and Martin, 1996; Martin et al., 1998; Merrill et al., 1998]. We found higher rates of childhood physical abuse (37%) compared with that cited by Child Protective Services for the general population (25%) [US Department of Health and Human Services, 1996]. However, compared with female army soldiers, our rate of childhood physical abuse excluding sexual abuse was similar (11% versus 15%) [Merrill et al., 1999].

As discussed in Sadler et al., 2000, this study has several potential limitations. These include generalizability of results (due to the cross-sectional design and characteristics of this sample); difficulty with estimating response rates; recall bias; and self-selection. This study was not designed to assess race of victim or perpetrator as a risk factor for rape. However, our findings indicate the need for further study of this issue. As the majority of our participants were white, these results may not be generalizable to racial or ethnic minorities.

CONCLUSION

Exposures to sexualized workplaces and barracks in the military environment were associated with increased odds of rape. Appropriate officer leadership apparently plays an important role in determining the military environment and safety of women. The role that drugs and/or alcohol plays as a risk factor for sexual assault was notable given the frequency with which the assailant was reported to be under the influence at the time of rape. Given the serious health consequences of rape and sexual violence, consistent rates of rape across eras of service and findings of repeated rapes indicate that violence towards military women remains a serious public health concern. Continued research identifying the relative power of factors that promote and maintain a sexualized military environment is necessary in order to develop interventions and policies to decrease the level of risk and increase the protection for women.

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