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Sexually Transmitted Infections in the U.S. Military:
How Gender Influences Risk

A dissertation submitted in partial satisfaction of the
Requirements for the degree Doctor of Philosophy
In Epidemiology

by

Shauna Lynn Stahlman

2014

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ABSTRACT OF THE DISSERTATION

Sexually Transmitted Infections in the U.S. Military: How Gender Influences Risk

by

Shauna Lynn Stahlman

Doctor of Philosophy in Epidemiology

University of California, Los Angeles 2014

Professor Pamina M. Gorbach, Chair

Rates of sexually transmitted infections (STIs) in the U.S. military have historically been higher than those of civilians. One likely contributor to high military STI rates is the high prevalence of behaviors that correspond with transmission of STIs, including binge drinking, lack of condom use, and multiple sexual partnerships. Other potential contributors include the high prevalence of mental health conditions as well as unwanted sexual contact (i.e., sexual assault). In particular, women in the military tend to have higher rates of STIs than both their male colleagues in the military and their female peers in the general population. This dissertation aims to better understand the differences in sexual risk behaviors and risk for STIs between men and women in the military, and between women in the military and women in the general U.S. population.

It also aims to describe the factors associated with unwanted sexual contact and mental health among service women in particular.

This dissertation utilizes data from the 2008 Department of Defense Survey of Health Related Behaviors among Active Duty Personnel (HRBS) in order to estimate the prevalence of STIs and sexual risk behaviors among military personnel. Chapter 1 identifies and provides background information on women in the military as well as STI risk factors. Chapter 2 compares STI risk behaviors between men and women in the military and describes the factors that are associated with report of an STI and with report of multiple sexual partners, among both genders. Chapter 3 examines the relationships between unwanted sexual contact, sexual risk behaviors, mental health, and substance use among women in the military. Finally, Chapter 4 utilizes data from the 2007-2010 National Health and Nutrition Examination Survey (NHANES) in order to estimate the prevalence of STIs and sexual risk behaviors among women in the general population. These estimates are then compared to those of service women in the 2008 HRBS. Findings from this dissertation expand the current understanding of sexual risk behaviors among women in the military, and have implications for the development of interventions that promote sexual health among female service members in the United States.

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PUBLICATIONS AND PRESENTATIONS

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Methamphetamine Use among Women attending STD Clinics in Los Angeles County, Shauna Stahlman, Marjan Javanbakht, Ali Stirland, Sarah Guerry, and Pamina Gorbach. Abstract presented at the 34th Annual Meeting & Scientific Sessions of the Society of Behavioral Medicine, March 2013.

Javanbakht, M., S. Stahlman, S. Walker, et al. *Provider perceptions of barriers and facilitators of HPV vaccination in a high-risk community*. Vaccine, 2012. 30(30): 4511-4516.

Findings from a Global Internet Survey on Rectal Douching Patterns for Anal Intercourse, Marjan Javanbakht, Shauna Stahlman, Jim Pickett, Marc-Andre LeBlanc, Pamina Gorbach. Abstract presented at the International AIDS Conference, July 2012.

Rectal Douching and Lubricant Use among Global Web-Survey Respondents, Shauna Stahlman, Marjan Javanbakht, Jim Pickett, Marc-Andre LeBlanc, and Pamina Gorbach. Oral presentation given at the International Microbicides Conference, April 2012.

A Qualitative Assessment of Facilitators and Barriers to HPV Vaccination Among Providers Serving a High-Risk Community, Marjan Javanbakht, Shauna Stahlman, Susan Walker, Sami Gottlieb, Lauri Markowitz, Nicole Liddon, Aaron Plant, Sarah Guerry. Abstract presented at the 19th International Society for STD Research, July 2011.

Qualitative Assessment of Anal Intercourse and Rectal Lubricant Use among Women in Los Angeles, Marjan Javanbakht, Joelle Brown, Bitu Amani, Shauna Stahlman, Pamina Gorbach, Stephen Brown, Colleen Murphy, Marjan Hezareh. Abstract presented at the 19th International Society for STD Research, July 2011.

Chapter 1. Introduction and Background

1.1 Introduction

The proportion of women serving in the military has increased dramatically since the 1970s, with over 203,000 women or 14.4% of all active duty forces serving in 2010¹ as compared with 7,000 during the Vietnam era.² Women in the active duty U.S. military are exposed to a gender-imbalanced environment where a high prevalence of sexual risk behaviors such as binge drinking, multiple sexual partners and infrequent condom use exist,³⁻⁵ which may contribute to risk for sexually transmitted infections (STIs). Although the prevalence of sexual risk behaviors are high among both male and female service members,⁶ compared to men, service women may be at a disproportionately higher risk of STIs.⁷ These STIs can lead to important adverse health consequences, such as increased risk for infertility, cervical and genital cancer, and HIV.^{8,9} Other conditions of the military environment, such as limited access to contraceptives during deployment¹⁰ and unwanted sexual contact¹¹ may further contribute to the need for unique sexual health services for women. Alternatively, active duty service women may be at a higher risk for STIs compared to the general population because they tend to be younger, unmarried, and composed of racial/ethnic minority groups¹ and these demographic factors have been associated with an increased STI risk in the general population.¹²⁻¹⁴ However, it is currently unclear whether differences in prevalence of risk behaviors are due to military social and environmental factors or because most women in the military represent the demographic at risk.

To better understand the correlates of STI risk among women in the U.S. military, this dissertation project used data from the 2008 Department of Defense Survey of Health Related Behaviors among Active Duty Military Personnel (HRBS) to investigate patterns in sexual risk behaviors and characterize differences in STI risk by gender; to explore behavioral characteristics associated with report of a recent STI and report of recent multiple sexual partners among military personnel; and to determine factors associated with report of unwanted sexual contact, such as substance use and mental health conditions, among women. In addition, data from the 2007-2010 National Health and Nutrition Examination Survey (NHANES) were used to estimate the prevalence of STIs and sexual risk behaviors among women in the general population, and these estimates were then weighted and compared to those of service women in the 2008 HRBS.

Findings from this dissertation expand the current understanding of sexual risk behaviors among women in the military, and have implications for the development of interventions that promote sexual health among female service members in the United States. Ultimately, this research might assist sexual health planning needs for active duty servicewomen and is relevant to both the Military Health System and U.S. public health.

1.2 History of women in the U.S. military

Women first became eligible to serve as permanent members of the Armed Forces with the passage of the Armed Services Integration Act of 1948.¹⁵ In 1973, the military transitioned to an “All-Volunteer Force” and women were actively recruited and

granted greater opportunities to serve.² The majority of advances for women serving in the military were made in the 1990s, as thousands of women were deployed for the Gulf War² and women became eligible to fly combat aircraft and serve on combatant ships.² However, in 1994 the Department of Defense created the Direct Ground Combat Definition and Assignment Rule (DGCDAR), which essentially restricted women from engaging in missions of direct ground combat.^{16, 17} In 2012 the Department of Defense amended DGCDAR to increase job opportunities for women in the military. However, women continued to be banned from serving in the infantry and special operations forces.¹⁶ On January 24, 2013 the Department of Defense rescinded the DGCDAR, thereby lifting the ban on women in combat roles.¹⁸

Since September 11, 2001, more than 200,000 women have been deployed to Iraq in Operation Iraqi Freedom and to Afghanistan in Operation Enduring Freedom.¹⁹ Although the majority of female soldiers presently fill administrative or medical occupational roles,² the percentage of women veterans who have served in combat zones has increased from 7% since before the 1990s to 24% among those who have served since 1990.²⁰ As the role of women in the military expands, women have greater interaction with male personnel and potential sex partners. These women comprise a unique group, exposed to an unusual and complex sociocultural environment with structural constraints and gender imbalance. Specifically, this environment may facilitate STI transmission.

1.3 Prevalence of STIs among service women

STIs have historically plagued the United States military, with rates being consistently higher than those in the civilian population even during peacetime.^{21, 22} The prevalence of STIs such as chlamydia and gonorrhea among asymptomatic military women has been reported as ranging from 5-10% overall^{21, 23, 24} as compared to 2-5% in the general population of young adult women.^{14, 25} One study of 1,841 female Marine Corps recruits who were screened for chlamydia, gonorrhea, and trichomoniasis upon entry into training found that 14% tested positive.²⁶ Another reported the incidence of chlamydia among servicewomen to be up to seven times higher than in the general population living in the same state over a 6-year period after standardizing for age and race/ethnicity.²² However, it is difficult to compare STI rates between military and civilian women because routine chlamydia testing for military women less than 26 years of age is provided in all service branches,^{27, 28} whereas in the general population women may only be screened if they have access to and seek health care services.

In addition to STI rates being higher in the military population as compared with the general population, women serving in the military also experience higher rates than their male colleagues. In one study of personnel deployed to Iraq in which both men and women were screened, rates of chlamydia were almost four times higher in women than men and rates of gonorrhea were over twice as high.⁷ Further, a study of 11,771 active duty US Army personnel reported that women were more likely than men to be re-infected with chlamydia.²⁹ Although the rate of new HIV diagnoses among active duty military women is low,³⁰ STIs remain an important risk factor for HIV that should not be ignored.

1.4 Condom use

In the 2005 HRBS, 36% of sexually active unmarried women reported condom use at last intercourse.⁶ This is similar to the rate of condom use observed in the general population of women ages 15-44 years who report any sexual risk behaviors, such as having five or more opposite-sex sex partners, sex in exchange for money or drugs, or illicit drug injection (34%).³¹ Among military men and women, condom use is associated with younger age (<21 years compared to 21-25 years), lower education levels, and an enlisted rank as compared to officer rank.⁶ Service members are also more likely to use condoms if they have multiple sexual partners within the past 12 months.⁶ However, gender-specific reasons for condom use may also exist. A qualitative study of women enlisted in the Navy revealed that women face unique challenges to condom use as compared to men, such as feeling stigmatized as promiscuous if they were to take condoms left out by the doctor when entering port.³² Women also reported not using condoms because if the condom was found it would be evidence of sexual activity, which is prohibited during deployment.³² Therefore, the military presents several potential barriers to condom use, and some of these barriers may be gender-specific.

1.5 Multiple sexual partnerships

Several studies report high prevalence of new or concurrent sexual partners among military personnel. In one study of over one thousand male and female Army recruits, almost 60% reported more than one sexual partner within the past year.⁴ In another study of 13,204 female Army recruits, 27% of women reported having more

than one sexual partner in the past 90 days and 31% reported a new partner.²¹ Further, a study of 999 Midwestern female Veterans enrolled at the Veterans Health Administration (VA) indicated that both the number of partners and the number of sexual partners who had other concurrent sexual partners increased during military service as compared to before service.³³

Behavior and sexual networks, such as the number and type of an individual's sexual partners,³⁴ are important determinants of STI risk. Prior to this dissertation, independent risk factors for multiple sexual partners within the military had not been clearly identified. In the general U.S. population, however, these risk factors include alcohol or drug use, young age at first intercourse (less than or equal to 13 years of age), and a Black race/ethnicity.³⁵ It was suspected that these were risk factors among the military population as well. For example, in a 1991 study of female Army soldiers, younger adolescent soldiers reported a greater number of sexual partners than those who were post-adolescent.³⁶ This dissertation project sought to provide a greater understanding of the correlates of multiple partnerships among military personnel, which is an important factor contributing to STI transmission.

1.6 Binge drinking

Binge drinking is a highly prevalent military phenomenon and there is evidence that rates of binge drinking are increasing for all military personnel, from 35% in 1998 to 47% in 2008.³⁷ One survey of U.S. Army recruits reports a 33% prevalence of binge drinking in the past 30 days among female respondents,⁴ as compared to 6-7% of women in the general population.³⁸ However, this prevalence is similar to the binge

drinking prevalence of women in the general population aged 18-25 years (33%)³⁹, and suggests that the high binge drinking prevalence in the military may be partially attributable to the younger age distribution of women in the military.

A qualitative study of Navy personnel revealed that high prevalence of binge drinking among servicewomen may also be partially attributed to the desire to fit in with male colleagues.³² In addition, binge drinking may leave women vulnerable to the possibility of nonconsensual sexual encounters. In particular, binge drinking among servicewomen has been associated with infrequent condom use and unwanted sexual encounters.⁴ A survey of women veterans further reports that 33% had unintended sex after drinking or using drugs during their military service.³³ Because of the high prevalence of military binge drinking, this dissertation project sought to determine the magnitude of the role that binge drinking plays in STI risk.

1.7 Illicit substance use including prescription drug use for non-medical purposes

As opposed to binge drinking, the use of illicit drugs such as marijuana or cocaine was lower among service personnel as compared to civilians in 2008.³⁷ This could be due to the fact that active duty members must undergo urine drug testing at least once per year.⁴⁰ Although not as common as binge drinking, substance use may still play a facilitating role in sexual risk behaviors among military personnel. The reported prevalence of illicit substance use including prescription drug misuse among military personnel in the past 30 days was 12% in 2008.³⁷ In addition, some evidence suggests that prescription drug use for nonmedical purposes is increasing within the military.³⁷

“Nonmedical” purpose is defined as use without a doctor’s prescription, in greater amounts or more often than prescribed, or for reasons such as getting “high”.³⁷

Nonmedical prescription drug use is reported to be highly prevalent among all military branches (11% in the past 30 days); however, prevalence varies by age group and drug use measure.³⁷ Among young adults aged 18 to 25 in the general population, the rate of current nonmedical use of prescription drugs in 2011 was 5%.⁴¹ These data indicate that use of illicit substances including prescription drug misuse within the military is not negligible, and the role that substance use plays in facilitating STI risk should be examined.

1.8 Unwanted sexual contact

The Department of Defense 2012 Workplace and Gender Relations Survey of Active Duty Members recently reported an overall prevalence of unwanted sexual contact of 6.1% in women and 1.2% in men.⁴² Unwanted sexual contact may in turn lead to military sexual trauma (MST). MST is defined by the VA as "psychological trauma, which in the judgment of a VA mental health professional, resulted from a physical assault of a sexual nature, battery of a sexual nature, or sexual harassment which occurred while the Veteran was serving on active duty or active duty for training."⁴³ According to VA national surveillance data, 22% of women and 1% of men have experienced some kind of MST.¹¹ A recent literature review found that the overall prevalence of MST ranges from 20-43%, though rates vary depending on data collection methods, sample types, phrasing of the question and the definition of MST being used.⁴⁴

There are numerous health-related consequences of MST. Among studies examining female veterans, women with a history of sexual assault were more likely to experience depression, post-traumatic stress disorder, and substance use.^{45, 46} It has also been associated with an increased number of physical symptoms such as pelvic pain, menstruation problems, back pain, headaches, chronic fatigue, and gastrointestinal symptoms.⁴⁴ MST may play a role in STI risk; however, further research is needed to clarify this potential link, particularly because an association between sexual assault and STI risk has been found in the general population.^{47, 48} In addition, one recent nationwide study of veterans utilizing VA healthcare services found that among veterans with MST, the risk for having an STI increased in the presence of certain mental health diagnoses.⁴⁹

1.9 Mental health characteristics of service women

Studies have indicated that individuals with serious mental illnesses can have higher rates of STI/HIV risk behaviors.⁵⁰ For example, women with a chronic mental illness may be more vulnerable to coerced sex and have higher levels of impulsivity.⁵¹ In one study of 400 patients attending an outpatient psychiatry clinic, more than half did not use a condom at the last five sex acts and almost 25% reported binge drinking in the past 6 months.⁵²

Women in the military are particularly susceptible to several mental health diagnoses such as suicidal ideation, posttraumatic stress disorder (PTSD), stress, anxiety, and depression.¹⁵ According to preliminary survey data conducted by the National Institute of Mental Health and US Army, the overall suicide rate increased more for women than

men when comparing soldiers never deployed to those currently deployed to Iraq and Afghanistan between 2004 and 2008.⁵³ PTSD is the most common mental health diagnosis of recent male and female veterans according to a study of 103,788 recent veterans (n=13,652 women) receiving healthcare through the VA.⁵⁴ Therefore, it is important to consider the relationship between mental health and STI risk in the military due to the high prevalence of mental health conditions such as PTSD.

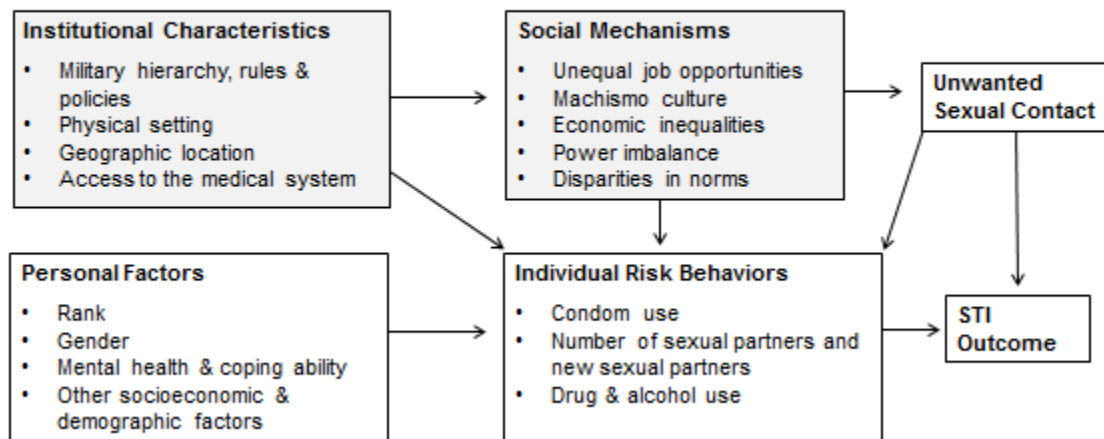
Deployed women may also face different sources of stress and anxiety in comparison to men. For example, family separations can be particularly stressful and a perceived loss of intimate relationships has been associated with an increased risk of PTSD in women but not among men.⁵⁵ Similar to the general population, depression in service members is more likely to occur in women than in men.⁵⁶ This dissertation will investigate how these mental health factors contribute to sexual risk behaviors and STI risk among servicewomen because little is known about the magnitude of these relationships.

1.10 Conceptual model

The conceptual model shown below was adapted from the Moos Person-Environment Theoretical Framework⁵⁷ and applied to a military setting. Moos's model asserts that behavior change is affected by continuous life stressors and social resources in the environment system, and demographic characteristics and personal resources in the personal system.⁵⁷ In a military setting, this might correspond to work-related stress as well as an individual's rank or coping ability affecting their level of drug and alcohol use. The model below also borrows from the Theory of Gender and Power,

which was developed by Robert Connell in 1987 in order to characterize the gendered relationships between men and women at the societal and institutional levels.⁵⁸ This modified model suggests that gender imbalances in power within the military can lead to increased risk for STIs among women, such as by decreasing a woman's negotiating ability to use condoms.

Figure 1.1. Conceptual model of personal and environmental factors contributing to STIs in a military setting, adapted from the Moos Person-Environment Theoretical Framework and the Theory of Gender and Power.



1.11 References

1. *2010 Demographics Profile of the Military Community*, Department of Defense.
2. National Center for Veterans Analysis and Statistics, *America's Women Veterans: Military Service History and VA Benefit Utilization Statistics*. Department of Veterans Affairs. Washington DC (2011). Available at: http://www.va.gov/VETDATA/docs/SpecialReports/Final_Womens_Report_3_2_12_v_7.pdf.
3. Goyal, V., K.M. Mattocks, and A.G. Sadler, *High-risk behavior and sexually transmitted infections among U.S. active duty servicewomen and veterans*. J Womens Health (Larchmt), 2012. **21**(11): p. 1155-69.
4. O'Rourke, K., A. Richman, M. Roddy, et al., *Does pregnancy/paternity intention predict contraception use? A study among US soldiers who have completed initial entry training*. J Fam Plann Reprod Health Care, 2008. **34**(3): p. 165-8.
5. Hwang, L.Y., M.A. Shafer, L.M. Pollack, et al., *Sexual behaviors after universal screening of sexually transmitted infections in healthy young women*. Obstet Gynecol, 2007. **109**(1): p. 105-13.
6. RTI International. (2006). *2005 Department of Defense Survey of Health Related Behaviors Among Active Duty Military Personnel*.
7. Aldous, W.K., J.L. Robertson, B.J. Robinson, et al., *Rates of gonorrhea and Chlamydia in U.S. military personnel deployed to Iraq and Afghanistan (2004-2009)*. Mil Med, 2011. **176**(6): p. 705-10.
8. Aral, S.O., *Sexually transmitted diseases: magnitude, determinants and consequences*. Int J STD AIDS, 2001. **12**(4): p. 211-5.
9. Cohen, M.S. and W.C. Miller, *Sexually transmitted diseases and human immunodeficiency virus infection: cause, effect, or both?* Int J Infect Dis, 1998. **3**(1): p. 1-4.
10. Powell-Dunford, N.C., A.S. Cuda, J.L. Moore, et al., *Menstrual suppression for combat operations: advantages of oral contraceptive pills*. Womens Health Issues, 2011. **21**(1): p. 86-91.
11. Kimerling, R., K. Gima, M.W. Smith, et al., *The Veterans Health Administration and military sexual trauma*. Am J Public Health, 2007. **97**(12): p. 2160-2166.
12. Eggleston, E., S.M. Rogers, C.F. Turner, et al., *Chlamydia trachomatis Infection Among 15-to 35-Year-Olds in Baltimore, MD*. Sexually Transmitted Diseases, 2011. **38**(8): p. 743-749.

13. Navarro, C., A. Jolly, N. Rama, et al., *Risk factors for genital chlamydial infection*. Canadian Journal of Infectious Diseases, 2002. **13**(3): p. 195-207.
14. Datta, S.D., E. Torrone, D. Kruszon-Moran, et al., *Chlamydia trachomatis Trends in the United States Among Persons 14 to 39 Years of Age, 1999-2008*. Sexually Transmitted Diseases, 2012. **39**(2): p. 92-96.
15. Boyd, M.A., W. Bradshaw, and M. Robinson, *Mental Health Issues of Women Deployed to Iraq and Afghanistan*. Archives of Psychiatric Nursing, 2013. **27**(1): p. 10-22.
16. Baldor, L.C. *Military Women To Serve Closer To Front Lines, According To Pentagon Report*. Huffington Post, 2012. Available at: http://www.huffingtonpost.com/2012/02/09/military-women_n_1266038.html.
17. Office of Under Secretary of Defense Personnel and Readiness, Report to congress on the Review of Laws, Policies and Regulations Restricting the Service of Female Members in the U.S. Armed Forces. Department of Defense. (2012). Available at: http://www.defense.gov/news/WISR_Report_to_Congress.pdf.
18. U.S. Department of Defense Office of the Assistant Secretary of Defense (Public Affairs) *Defense Department Rescinds Direct Combat Exclusion Rule; Services to Expand Integration of Women into Previously Restricted Occupations and Units*. 2013. Available at: <http://www.defense.gov/releases/release.aspx?releaseid=15784>.
19. Burrelli, D.F., Women in Combat: Issues for Congress. Congressional Research Service. (2012). Available at: <http://www.fas.org/sqp/crs/natsec/R42075.pdf>.
20. Patten, E. and K. Parker *Women in the U.S. Military: Growing Share, Distinctive Profile*. Pew Research Social & Demographic Trends, 2011. Available at: <http://www.pewsocialtrends.org/2011/12/22/women-in-the-u-s-military-growing-share-distinctive-profile/2/#a-snapshot-of-active-duty-women>.
21. Gaydos, C.A., M.R. Howell, B. Pare, et al., *Chlamydia trachomatis infections in female military recruits*. N Engl J Med, 1998. **339**(11): p. 739-44.
22. Sena, A.C., W.C. Miller, I.F. Hoffman, et al., *Trends of gonorrhea and chlamydial infection during 1985-1996 among active-duty soldiers at a United States Army installation*. Clinical Infectious Diseases, 2000. **30**(4): p. 742-748.
23. Thomas, A.G., S.K. Brodine, R. Shaffer, et al., *Chlamydial infection and unplanned pregnancy in women with ready access to health care*. Obstet Gynecol, 2001. **98**(6): p. 1117-23.

24. Brodine, S.K., M.A. Shafer, R.A. Shaffer, et al., *Asymptomatic sexually transmitted disease prevalence in four military populations: Application of DNA amplification assays for Chlamydia and gonorrhea screening*. Journal of Infectious Diseases, 1998. **178**(4): p. 1202-1204.
25. Miller, W.C., C.A. Ford, M. Morris, et al., *Prevalence of chlamydial and gonococcal infections among young adults in the United States*. JAMA, 2004. **291**(18): p. 2229-36.
26. Boyer, C.B., L.M. Pollack, J. Becnel, et al., *Relationships among sociodemographic markers, behavioral risk, and sexually transmitted infections in U. S. female Marine Corps recruits*. Mil Med, 2008. **173**(11): p. 1078-84.
27. Garges, E., K. Holmes, and M. MacDonald. Focus on the Treatment of STDs in Military Populations - 2010 STD Treatment Guidelines Webinar. 2013. Available at: <http://www.cdc.gov/std/treatment/2010/Military-Webinar-slides.pdf>. Accessed April 7, 2013.
28. A Guide to Female Soldier Readiness, USACHPPM Technical Guide 281. June 2010. Available at: <http://phc.amedd.army.mil/PHC%20Resource%20Library/TG281finalJuly2010.pdf>. Accessed April 7, 2013.
29. Barnett, S.D. and J.F. Brundage, *Incidence of recurrent diagnoses of Chlamydia trachomatis genital infections among male and female soldiers of the US Army*. Sex Transm Infect, 2001. **77**(1): p. 33-6.
30. Armed Forces Health Surveillance Center, Updates: Routine Screening for Antibodies to Human Immunodeficiency Virus, Type 1 (HIV-1), Civilian Applicants for U.S. Military Service and U.S. Armed Forces, Active and Reserve Components. Silver Spring, Maryland (2012). Available at: <http://www.afhsc.mil/msmrToc>.
31. Anderson, J.E., W.D. Mosher, and A. Chandra, *Measuring HIV risk in the U.S. population aged 15-44: results from Cycle 6 of the National Survey of Family Growth*. Adv Data, 2006(377): p. 1-27.
32. Duke, M.R. and G.M. Ames, *Challenges of contraceptive use and pregnancy prevention among women in the US Navy*. Qualitative Health Research, 2008. **18**(2): p. 244-253.
33. Sadler, A.G., M.A. Mengeling, C.H. Syrop, et al., *Lifetime Sexual Assault and Cervical Cytologic Abnormalities Among Military Women*. Journal of Womens Health, 2011. **20**(11): p. 1693-1701.

34. Laumann, E.O. and Y. Youm, *Racial/ethnic group differences in the prevalence of sexually transmitted diseases in the United States: A network explanation*. Sexually Transmitted Diseases, 1999. **26**(5): p. 250-261.
35. Santelli, J.S., N.D. Brener, R. Lowry, et al., *Multiple sexual partners among US adolescents and young adults*. Fam Plann Perspect, 1998. **30**(6): p. 271-275.
36. Borsaytrindle, L.A., C.M. Pass, and S.M. Gilzean, *UNPLANNED PREGNANCY AMONG ACTIVE-DUTY ARMY FEMALES AS A READINESS ISSUE*. Mil Med, 1991. **156**(2): p. 82-86.
37. RTI International. (2009). *2008 Department of Defense Survey of Health Related Behaviors Among Active Duty Military Personnel*. Available at www.tricare.mil/tma/2008HealthBehaviors.pdf.
38. Naimi, T.S., R.D. Brewer, A. Mokdad, et al., *Binge drinking among US adults*. Jama-Journal of the American Medical Association, 2003. **289**(1): p. 70-75.
39. United States Department of Health and Human Services. Substance Abuse and Mental Health Services Administration. Center for Behavioral Health Statistics and Quality. *Results from the 2011 National Survey on Drug Use and Health: Detailed Tables. Table 2.44B – Alcohol Use, Binge Alcohol Use, and Heavy Alcohol Use in the Past Month among Persons Aged 18 to 25, by Demographic Characteristics: Percentages, 2010 and 2011* Available at <http://www.samhsa.gov/data/NSDUH/2011SummNatFindDetTables/NSDUH-DetTabsPDFWHTML2011/2k11DetailedTabs/Web/HTML/NSDUH-DetTabsSect2peTabs43to84-2011.htm#Tab2.44B>.
40. Status of Drug Use in the Department of Defense Personnel: Fiscal Year 2011 Drug Testing Statistical Report. Office of the Under Secretary of Defense for Personnel and Readiness. Washington, DC (2011). Available at: <http://prhome.defense.gov/RFM/READINESS/DDRP/metrics.aspx>.
41. Results from the 2011 National Survey on Drug Use and Health: Summary of National Findings and Detailed Tables. [SAMHSA Web site]. December 11, 2012. Available at: <http://www.samhsa.gov/data/NSDUH/2011SummNatFindDetTables/Index.aspx>. Accessed March 26, 2013.
42. Department of Defense, Workplace and Gender Relations Survey of Active Duty Members. (2012). Available at: <http://www.sapr.mil/index.php/research>.
43. National Center for PTSD. Military Sexual Trauma. [U.S. Department of Veteran Affairs website]. December 20, 2011. Available at: <http://www.ptsd.va.gov/public/pages/military-sexual-trauma-general.asp>. Accessed April 16, 2013.

44. Suris, A. and L. Lind, *Military sexual trauma - A review of prevalence and associated health consequences in veterans*. Trauma Violence & Abuse, 2008. **9**(4): p. 250-269.
45. Davis, T.M. and P.S. Wood, *Substance abuse and sexual trauma in a female veteran population*. J Subst Abuse Treat, 1999. **16**(2): p. 123-7.
46. Suris, A., L. Lind, T.M. Kashner, et al., *Sexual assault in women veterans: An examination of PTSD risk, health care utilization, and cost of care*. Psychosomatic Medicine, 2004. **66**(5): p. 749-756.
47. Lamba, H. and S.M. Murphy, *Sexual assault and sexually transmitted infections: an updated review*. Int J STD AIDS, 2000. **11**(8): p. 487-91.
48. Reynolds, M.W., J.F. Peipert, and B. Collins, *Epidemiologic issues of sexually transmitted diseases in sexual assault victims*. Obstet Gynecol Surv, 2000. **55**(1): p. 51-7.
49. Turchik, J.A., J. Pavao, D. Nazarian, et al., *SEXUALLY TRANSMITTED INFECTIONS AND SEXUAL DYSFUNCTIONS AMONG NEWLY RETURNED VETERANS WITH AND WITHOUT MILITARY SEXUAL TRAUMA*. International Journal of Sexual Health, 2012. **24**(1): p. 45-59.
50. Carey, M.P., K.B. Carey, L.S. Weinhardt, et al., *Behavioral risk for HIV infection among adults with a severe and persistent mental illness: Patterns and psychological antecedents*. Community Mental Health Journal, 1997. **33**(2): p. 133-142.
51. Coverdale, J.H., T.L. Bayer, L.B. McCullough, et al., *SEXUALLY-TRANSMITTED DISEASE PREVENTION SERVICES FOR FEMALE CHRONICALLY MENTALLY-ILL PATIENTS*. Community Mental Health Journal, 1995. **31**(4): p. 303-315.
52. King, C., J. Feldman, Y. Waithaka, et al., *Sexual risk behaviors and sexually transmitted infection prevalence in an outpatient psychiatry clinic*. Sexually Transmitted Diseases, 2008. **35**(10): p. 877-882.
53. National Institute of Mental Health. Science Update: Army STARRS Preliminary Data Reveal Some Potential Predictive Factors for Suicide. 2011. Available at: <http://www.nimh.nih.gov/science-news/2011/army-starrs-preliminary-data-reveal-some-potential-predictive-factors-for-suicide.shtml>. Accessed April 7, 2013.
54. Seal, K.H., D. Bertenthal, C.R. Miner, et al., *Bringing the war back home - Mental health disorders among 103 788 US veterans returning from Iraq and*

- Afghanistan seen at Department of Veterans Affairs facilities.* Arch Intern Med, 2007. **167**(5): p. 476-482.
55. Skopp, N.A., M.A. Reger, G.M. Reger, et al., *The Role of Intimate Relationships, Appraisals of Military Service, and Gender on the Development of Posttraumatic Stress Symptoms Following Iraq Deployment.* J Trauma Stress, 2011. **24**(3): p. 277-286.
 56. Maguen, S., D.D. Luxton, N.A. Skopp, et al., *Gender differences in traumatic experiences and mental health in active duty soldiers redeployed from Iraq and Afghanistan.* J Psychiatr Res, 2012. **46**(3): p. 311-316.
 57. Moos, R.H., *Connection between school, work, and family settings*, B.J. Fraser and H.J. Walberg, Editors. 1991, Pergamon: New York. p. 29-53.
 58. Connell, R.W. *Gender and Power.* NWSA Journal, 1988-1989. **1**, 326-329. Available at: <http://www.jstor.org/stable/4315913>.

Chapter 2. Self-Reported STIs and Sexual Risk Behaviors in the U.S. Military: A Comparison of Men and Women

2.1 Abstract

Background. Sexually transmitted infections (STIs) are prevalent in the U.S. military. However, there are limited data on risk-factor differences between genders.

Methods. We used data from the 2008 Department of Defense Survey of Health Related Behaviors among Active Duty Military Personnel to identify factors associated with self-reported STIs within the past 12 months and multiple sexual partners among sexually active unmarried service members.

Results. There were 10,250 active duty personnel; mostly White (59.3%) aged 21-25 years (42.6%). The prevalence of any reported STI in the past 12 months was 4.2% for men and 6.9% for women. One-fourth of men and 9.3% of women reported five or more sexual partners in the past 12 months. Binge drinking, illicit substance use, and unwanted sexual contact were associated with increased report of sexual partners among both genders. Family/personal-life stress and psychological distress influenced number of partnerships more strongly for women than men (Adjusted Odds Ratio [AOR]=1.58, 95% Confidence Interval [CI]=1.18, 2.12 and AOR=1.41, 95% CI=1.14, 1.76, respectively). After adjusting for potential confounders, we found that report of multiple sexual partners was significantly associated with report of an STI among men (AOR=5.87, 95% CI=3.70, 9.31 for five or more partners; AOR=2.35, 95% CI=1.59, 3.49 for 2-4 partners) and women (AOR=4.78, 95% CI=2.12, 10.80 for five or more partners; AOR=2.35, 95% CI=1.30, 4.25 for 2-4 partners).

Conclusions. Factors associated with report of increasing sexual partnerships and with report of an STI differed by gender. Gender-specific intervention strategies may be most effective in mitigating the factors that influence risky sexual behaviors among military personnel.

2.2 Introduction

Rates of sexually transmitted infections (STIs) in the U.S. military have historically been higher than those of civilians.^{1, 2} One likely contributor to high military STI rates is the high prevalence of behaviors that correspond with transmission of STIs, including binge drinking, lack of condom use, and multiple sexual partnerships.³⁻⁵ Another potential contributor is high prevalence of mental health conditions,⁶ although less is known about the relationship between mental health and STIs especially in a military setting.

In terms of risk behaviors, binge drinking is a common military phenomenon, with one survey of U.S. Army recruits (n=1,095) reporting a prevalence of 33% in the past 30 days among females and 49% among males.³ Binge drinking may, in turn, facilitate infrequent condom use. Women in the military tend to report less frequent condom use than both their male colleagues³ and their civilian women peers.^{4, 7} In a study of 1,712 women entering U.S. Marines recruit training, 71% reported using condoms inconsistently.⁴ Multiple sexual partnerships are also common, as indicated by findings from a study of male and female Army recruits in which almost 60% reported more than one sexual partner within the past year.³ However, risk factors for multiple sexual partners within the military have yet to be identified.

Previous literature suggests that individuals with mental health conditions such as mood or anxiety disorders can have higher rates of STI/HIV risk behaviors.⁸ In a study of 400 male and female patients attending an outpatient psychiatry clinic, more than half did not use a condom at the last five sex acts and almost 25% reported binge drinking in the past 30 days.⁹ Specifically, women with chronic mental illness may be more

vulnerable to coerced sex and have higher levels of sexual impulsivity.¹⁰ The prevalence of screening positive for posttraumatic stress disorder, major depression, or other mental health problem among service members returning from Iraq was 19% according to a population-based study of Army soldiers and Marines.¹¹ In particular, deployed women may respond differently to stress and anxiety in the workplace in comparison to men.¹² For example, family separations can be particularly stressful and a perceived loss of intimate relationships has been associated with an increased risk of PTSD in women but not men.¹³ Mental health factors and STI risk behaviors likely differ between men and women in the military, although it is unclear as to whether this contributes to a difference in STI risk.

In order to characterize STI risk by gender among active duty service members, our objectives were to (1) compare correlates of a recently reported STI between sexually active unmarried servicemen and servicewomen, (2) describe predictors of reported number of sexual partners, and (3) assess the relationship between STI risk and mental health. We hypothesized that (1) prevalence of reported STIs, unwanted sexual contact, and sexual risk behaviors such as lack of condom use would be higher for women, that (2) alcohol/substance use, as well as younger age would be associated with higher reported numbers of sexual partners for both sexes, and (3) adverse mental health indicators such as psychological distress would be correlated with unwanted sexual contact, alcohol and substance use, and sexual risk behaviors among men and women, thus increasing risk for STIs.

2.3 Methods

Study population and design

We used existing cross-sectional data from the 2008 Department of Defense Survey of Health Related Behaviors among Active Duty Military Personnel (HRBS) public use data file, which was obtained by study investigators in October 2012. The 2008 HRBS was a self-administered, anonymous questionnaire that consisted of a random stratified sample of all Army, Navy, Marine Corps, Air Force, and Coast Guard personnel on active duty during the time of data collection (May – July 2008).¹⁴ A total of 28,546 service members completed the questionnaire, including 20,927 men and 7,619 women. Recruits, academy cadets, and personnel who were “AWOL” or incarcerated were excluded. In the first stage of sampling, 64 military installments were selected via probability proportional to size methodology, stratified by service branch and world region.¹⁵ In the second stage, 600 personnel were randomly selected within strata of pay grade and gender in order to obtain enough completed surveys for women and officers.¹⁴ Data were collected in group sessions administered by RTI International and a small percentage of questionnaires were obtained by mail for those not attending the sessions. The survey took approximately 1 hour to complete and the overall response rate was 71.6%.¹⁴ IRB approval was obtained from RTI International and Department of Defense. We restricted our analysis to 10,250 (36%) sexually active unmarried personnel, where sexually active was defined as reporting at least one sexual partner within the past 12 months.

Key Measures

Drug and Alcohol Use

Binge drinking was defined as having four or more drinks per drinking occasion at least once in the past 30 days for women and five or more drinks for men. Illicit substance use in the past 12 months included any reported use of marijuana, cocaine, acid/“LSD”, PCP/“angel dust”, MDMA/“Ecstasy”, other hallucinogens, methamphetamine, heroin, GHB/GBL, or inhalants. Prescription drug misuse was defined as use without a doctor’s prescription, taken in greater amounts or more often than the drug was prescribed, or for reasons such as to get “high”, or for “thrills” or “kicks”. Prescription drug misuse in the past 12 months included any reported use of stimulants (other than methamphetamine), tranquilizers or muscle relaxants, sedatives or barbiturates, pain relievers, or anabolic steroids.

Sexual Risks/Risk Behaviors

Reported sexual risk behaviors included condom use at last sexual encounter, and number of sexual partners and new sexual partners in the past 12 months. In order to measure unwanted sexual contact since entering the military, respondents were asked “Has anyone ever made or pressured you into having some type of unwanted sexual contact – since entering the military? By sexual contact we mean any contact between someone else and your private parts or between you and someone else's private parts.” Respondents were also asked, “Have you ever had a sexually transmitted disease, such as gonorrhea, syphilis, chlamydia, or genital herpes?” and responded by indicating “Yes, within the past 12 months”, “Yes, more than 1 year ago”, or “No”. The STI outcome used in this analysis is the self-report of any STI in the past 12 months.

Mental Health

Mental health measures assessed 4 domains: 1) Stress due to military or personal life as self-perceived by the respondent; 2) Self-reported stress experienced as a result of being a woman in the military (females only); 3) Screening questions to assess the need for further mental health evaluation including psychological distress, anxiety, depression, and PTSD, which are hereafter referred to as “indicators” for mental health; and 4) Self-reported suicidal ideation and attempt since joining the military. Participants were screened for further mental health evaluation using scales that are described in detail elsewhere.^{15, 16} In particular, gender-related stress was assessed by asking, “In the past 12 months, how much stress did you experience as a woman in the military?”

Statistical analysis

Descriptive statistics such as frequencies and percentages were calculated for all variables of interest. Rao-Scott chi-square tests were used to determine crude associations between gender and various characteristics of active duty military men and women. Prevalence and 95% confidence intervals of specific characteristics were calculated separately for men and women.. Multivariable logistic regression was used to determine variables that were associated with the report of an STI in the past 12 months. Ordinal logistic regression was used to determine variables that were associated with the report of increasing numbers of sexual partners in the past 12 months. Ordinal logistic regression was used instead of multinomial logistic regression in order to simplify the interpretation of effect estimates. Factors were selected for inclusion in the multivariable analysis based on *a priori* knowledge of STI risk factors in the general population and the results of an initial bivariate analysis. In addition, we

checked for relevant statistical interactions with gender for each of the variables in the final multivariable models. For all analyses, SAS software version 9.2[®] (SAS Inc., Cary, NC) survey procedures were used in order to take complex sampling design into consideration.

2.4 Results

Unweighted Sample Demographics

There were a total of 10,250 sexually active unmarried military personnel, of whom 3,428 were female (Table 2.1). Most service members were between the ages of 21 and 25 years (42.61%), of an enlisted rank (87.2%), and more than half identified as Non-Hispanic White (59.3%). More than one-quarter (26.8%) had been deployed for a combat mission in the past 12 months.

Demographic and Behavioral Characteristics by Sex

Sexually active unmarried active duty military men and women differed significantly by a number of characteristics. In terms of alcohol and drug use, binge drinking and use of illicit substances such as heroin and “other” (including LSD, PCP, hallucinogens GHB, and inhalants) were more prevalent among male as compared with female service members (Table 2.2). In terms of sexual risk behaviors, men were more likely to report condom use at last sex (43.0% vs. 32.1%, $p<0.01$), more than five sexual partners in the past 12 months (25.2% vs. 9.3%, $p<0.01$), and two or more new sexual partners in the past 12 months (51.3% vs. 30.7%, $p<0.01$). Women were more likely to report having sex with a “main” sexual partner at last intercourse (82.5% vs. 62.9%,

$p<0.01$), unwanted sexual contact since entering the military (14.2% vs. 2.9%, $p<0.01$), and an STI in the past 12 months (6.9% vs. 4.2%, $p<0.01$).

Finally, there were differences between men and women in terms of mental health indicators. A higher proportion of women screened positive for depression (28.4% vs. 24.8%, $p<0.01$), anxiety (20.3% vs. 13.9%, $p<0.01$), and psychological distress (22.2% vs. 16.6%, $p<0.01$). The prevalence of reported “high” family/personal life stress as compared with no stress was also higher for women than men (22.9% vs. 19.2%, $p<0.01$).

Factors Associated with Report of an STI

Table 2.3 illustrates the adjusted odds ratios (AORs) and 95% confidence intervals for each characteristic associated with report of an STI. In two multivariable logistic regression models specific to each gender and controlling for age, race/ethnicity, and condom use at last sex, we found that illicit substance use (AOR=3.21) and unwanted sexual contact (AOR=2.52) were significantly associated with report of an STI in the past 12 months among males although the association was not significant among females. Further, we found that being African American (AOR=2.04) and screening positive for any mental health indicator (AOR=1.50) was associated with report of a recent STI among men; however, these associations were not significant among women. Reporting two to four sexual partners or five or more sexual partners in the past 12 months was a significant predictor of reported STI for both genders. Specifically, women who reported five or more sexual partners had almost five times the odds of

reporting an STI in the past 12 months and men had almost six times the odds, as compared with those who reported only one sexual partner.

Factors Associated with Reported Number of Sexual Partners

In order to determine factors that were independently associated with report of increasing numbers of sexual partnerships, we performed two ordinal logistic regression models separately for male and female service members (Table 2.4). The reported number of sexual partnerships decreased with increasing age for both men and women. Reported binge drinking (AOR=1.84 for men; AOR=2.28 for women), illicit substance use (AOR=2.33 for men; AOR=2.41 for women), and unwanted sexual contact since entering the military (AOR=2.09 for men; AOR=1.65 for women) were associated with the report of higher numbers of sexual partners among both genders. High level of stress from intimate and family relationships was associated with reporting more sexual partners among women only (AOR=1.51)

Mental Health Indicators and STI Risk Behaviors

Many of the mental health indicators were associated with sexual risk behaviors that could potentially increase risk for STIs. In a series of multiple logistic regression models controlling for age, race/ethnicity, and gender, we found that military personnel who screened positive for depression, anxiety, PTSD, high overall stress, high military-related or personal-life stress, high gender-related stress (among females only), psychological distress, or self-reported suicidal ideation were more likely to report binge drinking, any illicit substance use, no condom use at last sex, and higher number of

sexual partnerships, as compared with those who did not screen positive for those mental health indicators (Table 2.5). Females who reported high family/personal-life stress (AOR=1.58) or screened positive for psychological distress (AOR=1.41) were more likely than males to report higher numbers of sexual partners. In addition, self-reported stress experienced as a woman in the military was associated with higher numbers of sexual partners (AOR=1.57), binge drinking (AOR=1.51), and illicit substance use (AOR=3.12).

2.5 Discussion

Our findings point to important public health implications of the gender-specific nature of STI risk behaviors/characteristics among military personnel. In this sample of active duty personnel, the prevalence of binge drinking, substance use, and multiple sex partners was higher among men. Women, in contrast, had higher reported prevalence of STIs, unwanted sexual contact, lack of condom use at last sex, and several mental health indicators. Our findings confirm the work of previous studies, which have indicated that multiple partnerships and other high risk sexual behaviors such as lack of condom use are associated with laboratory diagnosed STIs.¹⁷⁻¹⁹ However, we present new findings that unwanted sexual contact and mental health may be related to report of STIs, specifically among male military personnel. This seems plausible given that in the general population, mental health disorders have been found to mediate the effect of sexual abuse on the risk of HIV/STIs among heterosexual men.²⁰ For women, being in a predominantly male occupation may cause them to face unique social stressors, such as feeling stigmatized as promiscuous if they request condoms²¹ or elevated

levels of sexual harassment during deployment.²² Intervention efforts within the military should be designed to address these gender-specific risks.

The means by which mental health influences STI risk by gender is complicated. Many mental health indicators in our dataset were associated with sexual risk behaviors; some of which were influenced by gender. Screening positive for any mental health indicator was significantly associated with report of an STI only among men. However, screening positive for psychological distress or reporting high family/personal life stress was associated with report of higher numbers of sexual partners among women. One potential explanation is that military women face high levels of sexism or “unwanted gender-related behaviors,”²³ which may predispose them to risky sexual behaviors. Although our data did not contain a direct measurement of sexism, the 2012 Workplace and Gender Relations Survey of Active Duty Members reported that 47% of active duty service women indicated experiencing sexist behavior in the past 12 months, which includes “verbal/nonverbal behaviors that convey insulting, offensive, and/or condescending attitudes based on the gender of the member.”²³ Previous research suggests that sexism can create psychological distress because it is particularly personal and degrading,²⁴ and that psychological distress is a probable link between sexism and increased sexual risk behaviors.²⁵ Alternatively, women who suffer from psychological distress may seek sexual partners as a way to feel better by experiencing physical intimacy with another person – perhaps in the hope that this may lead to emotional intimacy.²⁶

In addition to psychological distress, family separation is a major stressor for deployed women⁶ and military life can be stressful on couples’ relationships.²⁷ Stress

associated with lengthy deployments may interfere with the ability to maintain long-lasting relationships, such as by decreasing partner intimacy.²⁷ Another possible explanation is that long-lasting relationships are harder for women to maintain due to the greater availability of potential sex partners.²⁸ Qualitative studies are needed to clarify the relationship between mental health, multiple partnerships, and STI risk specific to women in the military.

These results should be interpreted in light of several limitations. First, the data is susceptible to self-reporting bias. Active duty military personnel may be un-willing to disclose sensitive information such as mental health status or substance use out of fear of punishment or losing their job. However, this survey was conducted anonymously via a paper questionnaire and measures were taken to encourage honest reporting. For example, neutral civilian teams collected the data and assured participants of data confidentiality, which may help to facilitate truthful responses. Second, this is a cross-sectional dataset and therefore causality cannot be established due to ambiguous time-ordering of events. Because our analysis was restricted to existing data, several variables may not perfectly capture associations of interest. For example, condom use at last sex may not be perfectly representative of an individual's condom use during the past 12 months in which he/she was at risk for STI infection. Respondents were not asked to report whether or not they had each individual STI, and they were not specifically asked about other common STIs such as trichomonas or genital warts. In addition, the past 12 months may have contained some time that was not spent in active duty if the respondent was not in active duty for at least 12 months at the time of the survey. However, only 1.6% of men and 2% of women in our sample reported being

on active duty for less than 12 months at the time of the survey. Further, respondents were not diagnosed for mental health outcomes but were instead screened positive for mental health indicators. Finally, military women may be more likely than men to know their STI status because women less than 26 years of age are screened for chlamydia at the female wellness encounter, which is performed prior to completion of Advanced Individual Training or Basic Officer Leader Course Phase 3.^{29, 30}

Despite limitations, our findings support the development of gender-specific STI intervention strategies among military personnel as well as the adoption of military policies to reduce stresses among women in the military. For example, gender-specific HIV/STI risk reduction programs consisting of group sessions and discussions have been shown to be successful in reducing risk behaviors among women in a family planning setting³¹ and may also be adaptable to a military setting. In addition, one qualitative study among soldiers in the National Guard found that some naturally occurring peer networks helped soldiers to reduce the stigma of seeking mental health care.³² A 2011 report from the Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury identified several methods of applying peer support in the military environment under the existing command structure,³³ although further research is needed to determine the most effective method. The report also noted that individuals must feel safe to make use of peer-support programs, which should include strong confidentiality agreements.³³ Peer-based programs to help cope with stress and increase treatment seeking for mental health care could benefit military personnel, particularly if they are gender-specific. Strategies that take gender into consideration may be most effective in mitigating the factors that influence risky sexual behaviors.

Table 2.1. Unweighted demographic characteristics of sexually active unmarried male and female service members, 2008 HRBS dataset (n=10,250)

<i>Demographics</i>	Men		Women		Total	
	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>
All personnel	6822	66.6	3428	33.4	10250	100.0
<i>Age, years</i>						
17-20	1216	17.8	604	17.6	1820	17.8
21-25	2959	43.4	1409	41.1	4368	42.6
26-34	1819	26.7	935	27.3	2754	26.9
35 or older	828	12.1	480	14.0	1308	12.8
<i>Race/ethnicity</i>						
White	4385	64.3	1695	49.5	6080	59.3
African American	905	13.3	774	22.6	1679	16.4
Hispanic	948	13.9	607	17.7	1555	15.2
Other	584	8.6	352	10.3	936	9.1
<i>Pay grade</i>						
Enlisted	6045	88.6	2896	84.5	8941	87.2
Officer	777	11.4	532	15.5	1309	12.8
<i>Service</i>						
Army	1451	21.3	766	22.4	2217	21.6
Navy	1622	23.8	782	22.8	2404	23.5
Air Force	1389	20.4	855	24.9	2244	21.9
Marine Corps	1356	19.9	651	19.0	2007	19.6
Coast Guard	1004	14.7	374	10.9	1378	13.4
<i>Deployed for combat, past 12 months</i>	1973	29.5	729	21.5	2702	26.8

Table 2.2. Difference in behaviors of sexually active unmarried service members by gender, 2008 HRBS dataset

Behaviors	Men (n=6,822)			Women (n=3,428)			p-value
	<u>n</u>	<u>%</u>	<u>95% CI</u>	<u>n</u>	<u>%</u>	<u>95% CI</u>	
Alcohol and Drug Use							
Binge drinking	4101	61.1	(57.1, 65.2)^	1290	38.1	(35.1, 41.2)	<.001***
Any illicit substance use, past 12 mo.	588	10.3	(8.5, 12.1)	215	6.6	(4.2, 9.1)	<.001***
Marijuana	466	8.3	(6.4, 10.1)	178	5.5	(3.1, 7.9)	0.007**
Cocaine	210	3.6	(2.6, 4.6)	66	2.0	(1.0, 3.0)	0.014*
Ecstasy	178	3.2	(2.5, 3.9)	66	2.3	(1.3, 3.3)	0.055
Methamphetamine	102	1.7	(1.2, 2.2)	30	0.9	(0.5, 1.2)	<.001***
Heroin	89	1.4	(1.0, 1.8)^	20	0.5	(0.1, 0.9)	0.004**
Other illicit substance	297	5.1	(4.3, 5.8)^	70	2.3	(1.3, 3.3)	<.001***
Any prescription drug use for non-medical purpose, past 12 mo.	1291	20.4	(18.7, 22.1)	771	23.8	(21.2, 26.3)	0.006**
Stimulants	188	3.3	(2.7, 3.9)	108	3.3	(2.4, 4.1)	0.993
Tranquilizers	416	6.8	(6.0, 7.7)	275	8.4	(6.9, 10.0)	0.032*
Sedatives	219	3.7	(3.0, 4.4)	142	4.4	(3.1, 5.7)	0.346
Painkillers	1199	18.9	(17.2, 20.5)	717	22.2	(19.6, 24.9)	0.009**
Steroids	156	2.6	(2.1, 3.0)	55	2.0	(1.3, 2.8)	0.248
Sexual Risks							
Condom use at last sex	2685	43.0	(40.9, 45.1)^	1005	32.1	(28.8, 35.4)	<.001***
Main partner at last sex	4404	62.9	(61.1, 64.6)	2839	82.5	(80.2, 84.8)^	<.001***

<i>No. of sex partners, past 12 mo.</i>							<.001***
5+	1654	25.2	(23.5, 26.8)^	339	9.3	(7.8, 10.8)	
2-4	2705	39.8	(38.4, 41.2)	1278	38.4	(35.2, 41.6)	
1	2463	35.0	(34.0, 36.1)	1811	52.3	(48.5, 56.0)^	
<i>No. of NEW sex partners, past 12 mo.</i>							<.001***
2+	3403	51.3	(50.2, 52.3)^	1069	30.7	(27.3, 34.1)	
1	1574	23.4	(22.5, 24.3)	965	31.3	(29.4, 33.3)^	
None	1799	25.3	(24.3, 26.4)	1383	37.9	(35.2, 40.7)^	
<i>Unwanted sexual contact</i>	196	2.9	(2.3, 3.6)	515	14.2	(12.0, 16.4)^	<.001***
<i>STI, past 12 mo.</i>	273	4.2	(3.5, 4.8)	217	6.9	(5.7, 8.1)^	<.001***
Mental Health Indicators							
<i>Depression</i>	1567	24.8	(23.2, 26.4)	977	28.4	(26.6, 30.2)^	0.002**
<i>Anxiety</i>	871	13.9	(12.2, 15.5)	678	20.3	(17.6, 22.9)^	<.001***
<i>PTSD</i>	762	12.2	(10.7, 13.7)	467	13.9	(12.4, 15.4)	0.097
<i>Overall stress</i>							<.001***
Low	3370	48.9	(46.1, 51.6)^	1421	40.9	(37.7, 44.1)	
Moderate	1821	27.0	(25.6, 28.4)	1079	31.6	(29.5, 33.7)^	
High	1571	24.1	(21.7, 26.5)	904	27.5	(25.1, 29.8)	
<i>High military-related stress</i>	1765	27.1	(25.1, 29.1)	1068	31.4	(28.6, 34.2)	<.001***
<i>High family or personal-life stress</i>	1256	19.2	(17.7, 20.6)	815	22.9	(20.9, 25.0)^	<.001***
<i>Any gender-Related stress</i>	--	--	--	2887	86.0	(83.9, 88.1)	--
<i>Psychological distress</i>	1053	16.6	(15.1, 18.1)	782	22.2	(19.3, 25.1)^	<.001***
<i>Suicide ideation</i>	341	5.7	(4.9, 6.4)	193	5.4	(3.9, 7.0)	0.797
<i>Suicide attempt</i>	85	1.4	(1.0, 1.8)	79	2.2	(1.4, 3.0)	0.048*

^a95% confidence intervals of the prevalence estimate do not overlap

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; P-values derived by Rao-Scott Chi-Square Test

Percentages shown are weighted; n's are unweighted

Table 2.3. Multivariable logistic regression models for characteristics associated with reported STIs among sexually active unmarried active duty personnel, 2008 HRBS dataset

<i>Characteristic</i>	<i>Men (n=6,099)</i>		<i>Women (n=3,083)</i>	
	<u>AOR</u>	<u>95% CI</u>	<u>AOR</u>	<u>95% CI</u>
<i>Age, years</i>				
17-20	1.00	Reference	1.00	Reference
21-25	1.25	0.67, 2.34	1.46	0.85, 2.53
26-34	1.32	0.87, 2.00	1.00	0.58, 1.74
35 or older	1.78	0.72, 4.41	0.52	0.21, 1.30
<i>Race/ethnicity</i>				
White	1.00	Reference	1.00	Reference
African American	2.04	1.40, 2.99*	1.63	0.92, 2.89
Hispanic	1.29	0.80, 2.09	0.92	0.47, 1.80
Other	0.74	0.37, 1.48	1.06	0.63, 1.76
<i>Illicit substance use</i>				
Yes	3.21	2.20, 4.69*	1.14	0.57, 2.28
No	1.00	Reference	1.00	Reference
<i>Condom use at last sex</i>				
Yes	0.76	0.57, 1.03	0.86	0.45, 1.62
No	1.00	Reference	1.00	Reference
<i>No. of sex partners, past 12 mo.</i>				
5+	5.87	3.70, 9.31*	4.78	2.12, 10.80*
2-4	2.35	1.59, 3.49*	2.35	1.30, 4.25*
1	1.00	Reference	1.00	Reference
<i>Unwanted sexual contact</i>				
Yes	2.52	1.58, 4.02*	0.85	0.52, 1.41
No	1.00	Reference	1.00	Reference
<i>Any mental health indicator[^]</i>				
Yes	1.50	1.05, 2.14*	1.10	0.59, 2.06
No	1.00	Reference	1.00	Reference

*p<0.05; P-values derived by multiple logistic regression

[^]includes anxiety, depression, ptsd, psychological distress, moderate or high stress, or any report of suicidal ideation or attempt

Table 2.4. Multivariable ordinal logistic regression models for characteristics associated with higher numbers of reported sexual partners in the past 12 months among sexually active unmarried active duty personnel, 2008 HRBS dataset

<i>Characteristics</i>	Men (n=6,046)		Women (n=3,047)	
	<u>AOR</u>	<u>95% CI</u>	<u>AOR</u>	<u>95% CI</u>
<i>Age, years</i>				
17-20	1.00	Reference	1.00	Reference
21-25	0.91	0.80, 1.04	0.52	0.39, 0.70*
26-34	0.81	0.69, 0.95*	0.38	0.27, 0.52*
35 or older	0.61	0.49, 0.75*	0.20	0.13, 0.30*
<i>Race/ethnicity</i>				
White	1.00	Reference	1.00	Reference
African American	1.87	1.53, 2.27*	0.83	0.63, 1.09
Hispanic	1.28	1.15, 1.43*	0.92	0.71, 1.19
Other	0.97	0.82, 1.15	1.12	0.83, 1.50
<i>Service</i>				
Army	1.00	Reference	1.00	Reference
Navy	1.01	0.85, 1.19	1.07	0.78, 1.48
Air Force	0.82	0.69, 0.96*	1.28	1.01, 1.63*
Marine Corps	0.98	0.81, 1.17	1.26	0.93, 1.72
Coast Guard	0.76	0.66, 0.88*	0.68	0.51, 0.91*
<i>Binge drinking</i>				
Yes	1.84	1.64, 2.06*	2.28	1.73, 2.99*
No	1.00	Reference	1.00	Reference
<i>Illicit substance use</i>				
Yes	2.33	2.00, 2.72*	2.41	1.82, 3.18*
No	1.00	Reference	1.00	Reference
<i>Condom use at last sex</i>				
Yes	1.23	1.09, 1.38*	1.01	0.79, 1.30
No	1.00	Reference	1.00	Reference
<i>Unwanted sexual contact</i>				
Yes	2.09	1.45, 3.01*	1.65	1.26, 2.18*
No	1.00	Reference	1.00	Reference
<i>Family/Personal-life stress</i>				
None	1.00	Reference	1.00	Reference
Low	0.94	0.85, 1.05	0.97	0.64, 1.48
High	0.94	0.83, 1.07	1.51	1.06, 2.17*

Reference is one sexual partner in the past 12 months

*p<0.05; P-values derived by ordinal logistic regression

Table 2.5. Multivariable logistic and ordinal logistic regression models for the relationships of mental health indicators and sexual risk behaviors among sexually active unmarried active duty personnel, 2008 HRBS dataset

<i>Mental Health Indicator</i>	<i>Binge drinking</i>		<i>Any illicit substance use</i>		<i>No condom use at last sex</i>		<i>Higher number of sexual partners</i>	
	<u>AOR¹</u>	<u>95% CI</u>	<u>AOR¹</u>	<u>95% CI</u>	<u>AOR¹</u>	<u>95% CI</u>	<u>AOR²</u>	<u>95% CI</u>
Depression	1.47	1.25, 1.73*	2.26	1.74, 2.92*	1.18	1.05, 1.33*	1.30	1.16, 1.45*
Anxiety	1.66	1.41, 1.97*	2.34	1.83, 2.99*	1.29	1.09, 1.54*	1.51	1.30, 1.74*
PTSD	1.80	1.58, 2.05*	2.99	2.49, 3.59*	1.22	1.04, 1.45*	1.88	1.55, 2.28*
High (vs. low) overall stress	1.65	1.39, 1.96*	2.16	1.73, 2.70*	1.25	1.10, 1.42*	1.61	1.44, 1.81*
High (vs. none) military-related stress	1.55	1.30, 1.84*	1.63	1.21, 2.18*	1.34	1.17, 1.52*	1.15	1.01, 1.30*
High (vs. none) family/personal-life stress	1.36	1.15, 1.61*	1.95	1.45, 2.62*	1.84	1.59, 2.13*	--	--
Male	--	--	--	--	--	--	1.08	0.98, 1.19
Female	--	--	--	--	--	--	1.70	1.29, 2.25*
Female vs. male	--	--	--	--	--	--	1.58	1.18, 2.12*
Psychological Distress	1.46	1.25, 1.70*	2.42	1.96, 2.99*	1.36	1.22, 1.52*	--	--
Male	--	--	--	--	--	--	1.38	1.21, 1.59*
Female	--	--	--	--	--	--	1.96	1.65, 2.32*
Female vs. male	--	--	--	--	--	--	1.41	1.14, 1.76*
High (vs. none) gender-related stress (females only)	1.51	1.05, 2.16*	3.12	1.51, 6.43*	1.28	0.87, 1.87	1.57	1.20, 2.06*
Suicide ideation	1.62	1.26, 2.10*	3.19	2.52, 4.02*	1.50	1.19, 1.88*	1.59	1.27, 1.99*

¹Multivariable logistic regression models control for age, race/ethnicity, and gender

²Multivariable ordinal logistic regression models control for age, race/ethnicity, and gender

*p<0.05

2.6 References

1. Sena, A.C., W.C. Miller, I.F. Hoffman, et al., *Trends of gonorrhea and chlamydial infection during 1985-1996 among active-duty soldiers at a United States Army installation*. Clinical Infectious Diseases, 2000. **30**(4): p. 742-748.
2. Shafer, M.A., C.B. Boyer, L.M. Pollack, et al., *Acquisition of Chlamydia trachomatis by young women during their first year of military service*. Sex Transm Dis, 2008. **35**(3): p. 255-9.
3. O'Rourke, K., A. Richman, M. Roddy, et al., *Does pregnancy/paternity intention predict contraception use? A study among US soldiers who have completed initial entry training*. J Fam Plann Reprod Health Care, 2008. **34**(3): p. 165-8.
4. Hwang, L.Y., M.A. Shafer, L.M. Pollack, et al., *Sexual behaviors after universal screening of sexually transmitted infections in healthy young women*. Obstet Gynecol, 2007. **109**(1): p. 105-13.
5. Goyal, V., K.M. Mattocks, and A.G. Sadler, *High-risk behavior and sexually transmitted infections among U.S. active duty servicewomen and veterans*. J Womens Health (Larchmt), 2012. **21**(11): p. 1155-69.
6. Boyd, M.A., W. Bradshaw, and M. Robinson, *Mental Health Issues of Women Deployed to Iraq and Afghanistan*. Archives of Psychiatric Nursing, 2013. **27**(1): p. 10-22.
7. Shih, S.L., C.A. Kebodeaux, G.M. Secura, et al., *Baseline correlates of inconsistent and incorrect condom use among sexually active women in the contraceptive CHOICE Project*. Sex Transm Dis, 2011. **38**(11): p. 1012-9.
8. Senn, T.E. and M.P. Carey, *HIV, STD, and Sexual Risk Reduction for Individuals with a Severe Mental Illness: Review of the Intervention Literature*. Curr Psychiatry Rev, 2008. **4**(2): p. 87-100.
9. King, C., J. Feldman, Y. Waithaka, et al., *Sexual risk behaviors and sexually transmitted infection prevalence in an outpatient psychiatry clinic*. Sexually Transmitted Diseases, 2008. **35**(10): p. 877-882.

10. Coverdale, J.H., T.L. Bayer, L.B. McCullough, et al., *SEXUALLY-TRANSMITTED DISEASE PREVENTION SERVICES FOR FEMALE CHRONICALLY MENTALLY-ILL PATIENTS*. Community Mental Health Journal, 1995. **31**(4): p. 303-315.
11. Hoge, C.W., J.L. Auchterlonie, and C.S. Milliken, *Mental health problems, use of mental health services, and attrition from military service after returning from deployment to Iraq or Afghanistan*. JAMA, 2006. **295**(9): p. 1023-32.
12. Mota, N.P., M. Medved, J. Wang, et al., *Stress and mental disorders in female military personnel: comparisons between the sexes in a male dominated profession*. J Psychiatr Res, 2012. **46**(2): p. 159-67.
13. Skopp, N.A., M.A. Reger, G.M. Reger, et al., *The Role of Intimate Relationships, Appraisals of Military Service, and Gender on the Development of Posttraumatic Stress Symptoms Following Iraq Deployment*. J Trauma Stress, 2011. **24**(3): p. 277-286.
14. RTI International. (2009). *2008 Department of Defense Survey of Health Related Behaviors Among Active Duty Military Personnel*. Available at www.tricare.mil/tma/2008HealthBehaviors.pdf.
15. Witt, M.B., K.L.R. Olmsted, K. Spagnola, et al., *2008 Department of Defense Survey of Health Related Behaviors Among Active Duty Military Personnel: Codebook for the Public Use File*. (2009).
16. Bray, R.M., M.R. Pemberton, M.E. Lane, et al., *Substance use and mental health trends among U.S. military active duty personnel: key findings from the 2008 DoD Health Behavior Survey*. Mil Med, 2010. **175**(6): p. 390-9.
17. Gaydos, C.A., M.R. Howell, T.C. Quinn, et al., *Sustained high prevalence of Chlamydia trachomatis infections in female army recruits*. Sex Transm Dis, 2003. **30**(7): p. 539-44.
18. Gaydos, C.A., M.R. Howell, B. Pare, et al., *Chlamydia trachomatis infections in female military recruits*. N Engl J Med, 1998. **339**(11): p. 739-44.

19. Cecil, J.A., M.R. Howell, J.J. Tawes, et al., *Features of Chlamydia trachomatis and Neisseria gonorrhoeae infection in male Army recruits*. J Infect Dis, 2001. **184**(9): p. 1216-9.
20. Sweet, T., M. Polansky, and S.L. Welles, *Mediation of HIV/STI risk by mental health disorders among persons living in the United States reporting childhood sexual abuse*. J Acquir Immune Defic Syndr, 2013. **62**(1): p. 81-9.
21. Duke, M.R. and G.M. Ames, *Challenges of contraceptive use and pregnancy prevention among women in the US Navy*. Qualitative Health Research, 2008. **18**(2): p. 244-253.
22. Polusny, M.A., M.J. Kumpula, L.A. Meis, et al., *Gender differences in the effects of deployment-related stressors and pre-deployment risk factors on the development of PTSD symptoms in National Guard Soldiers deployed to Iraq and Afghanistan*. J Psychiatr Res, 2014. **49**: p. 1-9.
23. Department of Defense, Workplace and Gender Relations Survey of Active Duty Members. (2012). Available at: <http://www.sapr.mil/index.php/research>.
24. Landrine H and E. Klonoff, *Discrimination against women: Prevalence, consequences, remedies*. 1997, Thousand Oaks, CA: Sage.
25. Choi, K.H., L. Bowleg, and T.B. Neilands, *The effects of sexism, psychological distress, and difficult sexual situations on U.S. women's sexual risk behaviors*. AIDS Educ Prev, 2011. **23**(5): p. 397-411.
26. Leigh, B.C., *Reasons for Having and Avoiding Sex: Gender, Sexual Orientation, and Relationship to Sexual Behavior*. The Journal of Sex Research, 1989. **26**(2): p. 199-209.
27. Benjamin R. Karney and J.S. Crown. *Families under stress: An assessment of data, theory, and research on marriage and divorce in the military*. 2007. Available at: www.rand.org.
28. South, S.J., and Lloyd, K. M., *Spousal alternatives and marital dissolution*. American Sociological Review, 1995. **60**: p. 21-35.

29. Garges, E., K. Holmes, and M. MacDonald. Focus on the Treatment of STDs in Military Populations - 2010 STD Treatment Guidelines Webinar. 2013. Available at: <http://www.cdc.gov/std/treatment/2010/Military-Webinar-slides.pdf>. Accessed April 7, 2013.
30. A Guide to Female Soldier Readiness, USACHPPM Technical Guide 281. June 2010. Available at: <http://phc.amedd.army.mil/PHC%20Resource%20Library/TG281finalJuly2010.pdf>. Accessed April 7, 2013.
31. Ehrhardt, A.A., T.M. Exner, S. Hoffman, et al., *A gender-specific HIV/STD risk reduction intervention for women in a health care setting: short- and long-term results of a randomized clinical trial*. AIDS Care, 2002. **14**(2): p. 147-61.
32. Pfeiffer, P.N., A.J. Blow, E. Miller, et al., *Peers and peer-based interventions in supporting reintegration and mental health among National Guard soldiers: a qualitative study*. Mil Med, 2012. **177**(12): p. 1471-6.
33. Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury. (2011). *Best Practices Identified for Peer Support Programs*. Available at http://www.dcoe.mil/content/Navigation/Documents/Best_Practices_Identified_for_Peer_Support_Programs_Jan_2011.pdf.

Chapter 3. Factors Associated with Self-Report of Unwanted Sexual Contact among Active Duty U.S. Military Service Women

3.1 Abstract

Background. U.S. military women are exposed to unwanted sexual contact, which can have important implications for physical and mental health. We aimed to explore the factors associated with report of unwanted sexual contact since entering the military.

Methods. Using data from the 2008 Department of Defense Survey of Health Related Behaviors, we employed multiple logistic regression methods to investigate factors associated with self-reported unwanted sexual contact since entering the military among sexually active service women.

Results. The sample included N=6,779 sexually active female military personnel, of which 12.4% reported unwanted sexual contact (includes any touching of genitals) since entering the military. Most women were between 21-25 years (36.8%), identified as White (53.3%) and were of enlisted rank (81.6%). After adjusting for age, race/ethnicity, marital status (including whether or not the spouse was present in the military), and history of unwanted sexual contact (before entering the military), we found that unwanted sexual contact was associated with screening positive for several mental health indicators. In addition, we identified a statistically significant interaction between psychological distress and marital status with report of unwanted sexual contact. Other factors independently associated with unwanted sexual contact included past month binge drinking (AOR=1.29, 95% CI=1.03, 1.63) and past year misuse of tranquilizers/muscle relaxers (AOR=1.58, 95% CI=1.22, 2.04).

Conclusions. Indicators of current mental health status are associated with reports of unwanted sexual contact. Findings support the development of confidential reporting systems for unwanted sexual contact and the need for mental health and substance use interventions.

3.2 Introduction

Women in the active duty U.S. military are exposed to a high prevalence of unwanted sexual contact.^{1, 2} The Department of Defense (DOD) 2012 Workplace and Gender Relations Survey of Active Duty Members recently reported the overall prevalence of unwanted sexual contact within the past 12 months was 6.1% in women and 1.2% in men.³ The DOD definition of unwanted sexual contact included “completed or attempted sexual intercourse, sodomy (oral or anal sex), penetration by an object, and the unwanted touching of genitalia and other sexually-related areas of the body.” In a large 3-year cohort study of U.S. service members, 9% of women reported sexual harassment and 2% reported sexual assault.¹ Unwanted sexual contact is an important health consideration particularly among service women because it is highly prevalent and has been associated with adverse mental health conditions^{4, 5} and substance use.^{6, 7}

Military sexual trauma (MST), which includes sexual harassment and sexual assault, has been associated with increased posttraumatic stress disorder (PTSD), depression, anxiety, and suicidal behavior among women veterans.⁸⁻¹⁰ One study of Iraq and Afghanistan veterans conducted using Department of Veterans Affairs (VA) administrative data found that women veterans with PTSD and MST were more likely to be diagnosed with comorbid depression and anxiety.¹¹ In addition, homeless veterans who have experienced MST are more likely than those without MST to be diagnosed with mental health conditions such as depression, PTSD, substance use disorders, anxiety disorders, and suicide behavior.¹² Fewer studies have documented the relationships between mental health and unwanted sexual contact during current U.S.

active duty military service, although there is good reason to suspect that these relationships exist.^{13, 14}

Unwanted sexual contact has further been associated with alcohol and substance use,^{6, 7} which can exacerbate psychological/psychiatric disorders¹⁵ and increase risk for sexual assault by means of perpetrators' deliberate intoxication of the victim or by means of victims' self-induced intoxication.^{6, 16} Among the women who reported unwanted sexual contact in the 2012 DOD Workplace and Gender Relations Survey, 47% indicated that they or the offender were drinking alcohol before the incident.³ Similarly, in the general population, alcohol and other substance use in association with unwanted sexual contact is highly prevalent.^{6, 7} For example, one study of 268 female sexual assault victims presenting at a medical center found that 51% reported heavy drinking and 29% reported marijuana use in the 6 weeks prior to the assault.⁷ Alcohol/substance use in the context of sexual assault is particularly concerning because it may lead to greater injury to the victim (when substances are being used by the offender)¹⁷ and also a higher prevalence of substance use after the incident,⁷ potentially as a coping mechanism by the victim.

It is currently unclear whether unwanted sexual contact directly or indirectly increases risk for sexually transmitted infections (STIs); although one recent nationwide study of veterans utilizing Veterans Health Administration healthcare services found that among veterans with military sexual trauma, the risk for having an STI increased in the presence of certain mental health diagnoses.¹⁸ Among college women, risky sexual behavior including report of multiple sexual partnerships has been positively associated with sexual assault and victimization.^{19, 20} However, few studies have examined the

associations between sexual risk behaviors and unwanted sexual contact in an active duty military setting.

In addition, it is unclear how marital status might modify associations with unwanted sexual contact in an active duty military setting. In the general population, longer duration of partner relationships is associated with lower rates of depression, suicidal behavior and substance abuse/dependence.²¹ Further, being married is associated with reduced risk of onset of mental disorders including substance use disorders among women.²² MST is also less common among married women.²³ Therefore, it is reasonable to suspect that being married might have a protective effect on the associations between mental health and unwanted sexual contact.

Our objective was to examine factors associated with increased report of unwanted sexual contact since entering the military among sexually active, active duty service women. In particular, we looked for associations with sexual risk behaviors, drug/alcohol use, and mental health indicators. We also explored interactions between marital status (unmarried, married with spouse present at current active duty location, or married without spouse present) and mental health and substance use. We hypothesized that alcohol/substance use, as well as screening positive for adverse mental health indicators (including stress, psychological distress, depression, PTSD, and anxiety), would be associated with increased self-report of unwanted sexual contact among active duty service women. We further hypothesized that these associations would be strongest among unmarried women and weakest among women married with their spouse present at their current active duty location.

3.3 Methods

Study population and design

We used existing data from the 2008 Department of Defense Survey of Health Related Behaviors among Active Duty Military Personnel (HRBS) public use data file, which was obtained by the study investigators in October 2012. The 2008 HRBS (N=28,546) was a self-administered, anonymous cross-sectional questionnaire. It consisted of a random stratified sample of all Army, Navy, Marine Corps, Air Force, and Coast Guard personnel on active duty during the time of data collection, from May – July 2008.²⁴ Recruits, academy cadets, and personnel who were “AWOL” or incarcerated were excluded. In the first stage of sampling, 64 military installments were selected via probability proportional to size methodology, stratified by service branch and world region.²⁵ In the second stage, 600 personnel were randomly selected within strata of pay grade and gender. Data were collected in group sessions administered by RTI International,²⁴ who informed participants of the voluntary nature of the survey, and a small percentage of questionnaires were obtained by mail for those not attending the sessions. The survey took approximately 1 hour to complete and the overall response rate was 71.6%.²⁴ Institutional Review Board approval for data collection was obtained from RTI International and Department of Defense.

For the purpose of determining mental health, substance use, and sexual risk behaviors associated with increased self-report of unwanted sexual contact since entering the military, we restricted our sample to 6,779 sexually active women who were either married or unmarried at the time of study participation. We defined sexually active as having reported at least one sexual partner within 12 months prior to participation.

Key Measures

Unwanted Sexual Contact

In order to measure unwanted sexual contact, respondents were asked “Has anyone ever made or pressured you into having some type of unwanted sexual contact? By sexual contact we mean any contact between someone else and your private parts or between you and someone else's private parts.” If they responded affirmatively, they were asked to specify at what ages they had experienced unwanted sexual contact, specifically “before 18 years of age,” “between age 18 and entering the military,” or “since entering the military.” For the purpose of our analysis, we defined unwanted sexual contact as any positive report since entering the military.

Drug and Alcohol Use

We used dichotomous variables for binge drinking, illicit substance use, and prescription drug misuse. Binge drinking was defined as reporting four or more drinks per drinking occasion at least once in the past 30 days. Illicit substance use in the past 12 months included any reported use of marijuana, cocaine, LSD (“acid”), PCP (“angel dust”), MDMA (“Ecstasy”), other hallucinogens, methamphetamine, heroin, GHB/GBL (“Liquid X” or “Gamma 10”), or inhalants. Because of the relatively low prevalence of illicit substance use in our sample, we created two variables for illicit substance use: 1) Any marijuana use in the past 12 months and 2) Any use illicit substances besides marijuana in the past 12 months. Prescription drug misuse was defined as use without a doctor’s prescription, taken in greater amounts or more often than the drug was prescribed, or for reasons such as to get “high”, or for “thrills” or “kicks”. Prescription

drug misuse in the past 12 months included any reported use of stimulants (other than methamphetamine), tranquilizers or muscle relaxants, sedatives or barbiturates, pain relievers, or anabolic steroids.

Sexual Risk Behaviors/STIs

Reported sexual risk behaviors included condom use at last sex, and number of sexual partners and new sexual partners in the past 12 months. Respondents were also asked, “Have you ever had a sexually transmitted disease, such as gonorrhea, syphilis, chlamydia, or genital herpes?” and whether or not it occurred within the past 12 months.

Mental Health

Mental health measures assessed 4 domains: 1) Stress due to military or personal life as self-perceived by the respondent; 2) Self-reported stress experienced as a result of being a woman in the military; 3) Self-reported suicidal ideation and attempt since joining the military; and 4) Screening questions to assess the need for further mental health evaluation including psychological distress, anxiety, depression, and PTSD. Specifically, the HRBS measured overall stress by asking respondents how much stress they experienced in the past 12 months due to military or personal life items. Cutoffs for moderate and high stress were based on the total sum of items. In addition, the HRBS asked respondents to report separately on military-related and family/personal life-related stresses. The questionnaire asked, “During the past 12 months, how much stress did you experience in your family life or in a relationship with your spouse, live-in fiancé, boyfriend or girlfriend, or the person you date seriously?”

and “During the past 12 months, how much stress did you experience at work or while carrying out your military duties?” Possible responses included “A lot,” “Some/a little” and “None at all.” Gender-related stress was assessed by asking, “In the past 12 months, how much stress did you experience as a woman in the military?” and response options were categorized as “A great deal/fairly large amount,” “Some/A little,” or “None.” Respondents also indicated whether they had seriously considered or attempted suicide since joining the military.

Participants screened positive for further mental health evaluation using scales that are described in detail elsewhere.^{25, 26} In brief, serious psychological distress was assessed using the K-6,²⁷ a 6-item scale that asks respondents how often they felt nervous, hopeless, restless or fidgety, so depressed nothing could cheer them up, that everything was an effort, and worthless in the past 30 days. PTSD was evaluated within the past 30 days using the 17-item PTSD Checklist-Civilian Version.²⁸ Cutoffs for a positive screen were based on the total sum of items. In addition, anxiety was assessed using items adapted from the Patient Health Questionnaire.²⁹ Respondents screened positive for anxiety if they reported feeling nervous, anxious, on edge, or worrying a lot about different things on more than half the days in the past 30 days and additionally reported three or more symptoms in the past 30 days. Finally, participants screened positive for depression if they reported: (a) feeling sad, blue, or depressed for 2 weeks or more in the past 12 months or (b) two or more years in their lifetime of feeling depressed and felt depressed “much of the time” in the past 12 months; and (c) feeling depressed on one or more days in the past week.²⁴

Statistical analysis

Descriptive statistics including frequencies and percentages were calculated for all variables of interest and Rao-Scott chi-square tests were used to evaluate bivariate associations of interest. The Rao-Scott chi-square test is a design-adjusted version of the Pearson chi-square test, which is used in order to account for complex sample survey design.³⁰ Prevalence and standard errors of specific characteristics were calculated for those reporting unwanted sexual contact since entering the military and compared with those not reporting unwanted sexual contact. Multivariable logistic regression models were then used to investigate associations between potential risk factors and reports of unwanted sexual contact. In addition, we checked for interactions between marital status and mental health and substance use in the final multivariable models. For all analyses, SAS software version 9.2[®] (SAS Inc., Cary, NC) survey procedures were used in order to take complex sampling design into consideration.

3.4 Results

Sample Demographics

There were a total of 6,779 sexually active female military personnel, of whom 3,428 were unmarried (Table 3.1). Seventy-eight women were missing data on unwanted sexual contact and were excluded from the analysis. Most women were between the ages of 21-25 years (36.7%) and more than half identified as Non-Hispanic White (53.4%). Although the sample was relatively evenly divided across service branches, the majority were of an enlisted rank (81.4%). Twenty-three percent of sexually active women had been deployed to a combat zone in the past year.

Demographic and Behavioral Characteristics among Those Reporting Unwanted Sexual Contact

The overall prevalence of unwanted sexual contact since entering the military was 12.4% among sexually active female personnel. Unwanted sexual contact since entering the military was most commonly reported by women who were White (66%), unmarried (62%), or serving in the Marine Corps (8.4%) (Table 3.1). In terms of substance use, report of binge drinking (39% vs. 30%, $p<0.001$) and misuse of tranquilizers/muscle relaxers (10% vs. 7%, $p=0.001$) was more prevalent among those reporting unwanted sexual contact as compared with those not reporting unwanted sexual contact. Report of five or more sexual partners in the past 12 months (11% vs. 5%, $p<0.001$), or two or more new sexual partners in the past 12 months (31% vs. 17%, $p<0.001$) was also more common among women reporting unwanted sexual contact.

In addition, unwanted sexual contact was highly correlated with screening positive for mental health indicators. Women reporting unwanted sexual contact were more likely to screen positive for depression (40% vs. 24%, $p<0.001$), anxiety (27% vs. 18%, $p<0.001$), PTSD (22% vs. 10%, $p<0.001$), and psychological distress (33% vs. 18%, $p<0.001$). Similarly, women who reported unwanted sexual were more likely to report high levels of overall stress (39% vs. 24%, $p<0.001$), family/personal life-related stress (29% vs. 20%, $p<0.001$), military-related stress (42% vs. 29%, $p<0.001$), and gender-related stress (50% vs. 38%, $p<0.001$) as compared with those who did not report unwanted sexual contact. Finally, those who reported suicidal ideation (12% vs. 4%, $p<0.001$) and attempt (4% vs. 2%, $p<0.001$) were also more likely to report unwanted sexual contact.

Factors Associated with Reported Unwanted Sexual Contact

After controlling for age, race/ethnicity, marital status, and history of unwanted sexual contact (before entering the military), we found that unwanted sexual contact was significantly associated with screening positive for depression (AOR=2.19, 95% CI=1.75, 2.75), psychological distress (AOR=2.21, 95% CI=1.76, 2.79), PTSD (AOR=2.80, 95% CI=2.09, 3.74), and anxiety (AOR=1.67, 95% CI=1.19, 2.35) (Table 3.2). Unwanted sexual contact was also associated with self-report of moderate (AOR=1.47, 95% CI=1.11, 1.95) or high overall stress (AOR=2.59, 95% CI=1.89, 3.53), “some/a little” (AOR=1.70, 95% CI=1.27, 2.28) or “a lot” of family/personal life stress (AOR=2.32, 95% CI=1.58, 3.39), and “some/a little” (AOR=1.62, 95% CI=1.13, 2.31) or “a lot” of military-related stress (AOR=2.65, 95% CI=1.88, 3.72). In addition, high gender-related stress (AOR=2.10, 95% CI=1.38, 3.19) was associated with unwanted sexual contact. Finally, unwanted sexual contact was associated with report of higher number of sexual partners (AOR=3.04, 95% CI=1.96, 4.69 for five or more sexual partners) and any new sexual partners (AOR=2.18, 95% CI=1.78, 2.69) in the past 12 months.

Interaction between Psychological Distress and Marital Status

We detected a statistically significant interaction between psychological distress and marital status (Fig. 3.1). Figure 3.1 shows how the adjusted odds ratio for the association of psychological distress and report of unwanted sexual contact varies by marital status and spouse presence. In particular, the association of psychological

distress and unwanted sexual contact was strongest among women who were married without their spouse present at their current active duty location (AOR=4.31, 95% CI=2.08, 8.90) and weakest among women who were married with their spouse present (AOR=1.43, 95% CI=0.99, 2.08). In other terms, women who were married with their spouse present had a weaker association between psychological distress and unwanted sexual contact as compared with unmarried women (AOR=0.58, 95% CI=0.36, 0.93) or married women without their spouse present (AOR=0.33, 95% CI=0.15, 0.72) (data not shown).

3.5 Discussion

Our study offers valuable insight into the factors associated with unwanted sexual contact among a large sample of active duty service women, who report a high prevalence of unwanted sexual contact. However, it is difficult to compare prevalence of unwanted sexual contact among women in the military with national survey estimates due to variations in the definition being used. A previously conducted smaller study of active duty women (n=323) found the prevalence of sexual assault in the past year, in combination with sexual harassment over the entirety of the respondent's military career, to be 10.5%.³² In that study, researchers defined sexual assault as attempted or completed forced sex.³² Our finding of 12.4% is higher than this estimate and the 6.1% estimated prevalence of unwanted sexual contact from the 2012 DOD Workplace and Gender Relations Survey.³ However, this difference is likely due to variations in the definition of unwanted sexual contact as well as the different time periods for assessment. Nonetheless, reports of unwanted sexual contact require attention and

action, particularly among female service members who experience a high prevalence in comparison to men.³

Previous studies have indicated an association between military sexual trauma and adverse mental health outcomes such as depression, PTSD or anxiety disorders among women veterans.^{2, 11, 23} Our study confirms relationships between mental health and unwanted sexual contact and contributes to the literature by identifying specific associations between unwanted sexual contact and military- and gender-related stresses in an active-duty setting. Unfortunately, we are not able to distinguish between adverse mental health indicators that occur as the result of unwanted sexual contact and unwanted sexual contact that occurs as the result of adverse mental health indicators. However, these associations are likely to be bi-directional. One recently conducted qualitative study of U.S. service women deployed overseas indicated that high stress levels as well as widespread sexism could facilitate unwanted sexual contact.³³ Other studies have indicated that MST is one of the largest contributors to PTSD among service women.^{23, 34} Thus, military-related stress and adverse mental health indicators could be both facilitators and results of unwanted sexual contact.

It is interesting to note that in terms of substance use, only the reported use of tranquilizers/muscle relaxants and binge drinking were associated with report of unwanted sexual contact in the multivariable logistic regression models. These findings are consistent with a previous study conducted among college women, which found that recent binge drinking and drinking to relieve emotional distress predicted unwanted sexual contact.³⁵ In addition, the National Study of Drug-facilitated, Incapacitated, and Forcible Rape found that alcohol and sedatives were among the most commonly

reported substances used among rape cases.³⁶ Disturbingly, one of the drugs listed in the HRBS questionnaire under “tranquilizers or muscle relaxers” is Rohypnol or “roofies,” which is a widely recognized date rape drug.³⁷ However, the lack of event-level data makes it unclear whether the use of these substances happened on the same occasion as the unwanted sexual contact.

Similar to the relationship between unwanted sexual contact and mental health, there is likely a bi-directional nature of substance use and unwanted sexual contact. In addition to heavy drinking or substance use predicting unwanted sexual contact,^{7, 35} the victim could also use alcohol/substance use as a self-medicating or coping strategy.^{7, 16,}³⁸ Self-reported misuse of prescription opioids, for example, has been associated with self-medication for depression in a sample of patients with no substance abuse history.³⁹ Other evidence indicates that persons with mental illness report substance use mainly for management of difficult emotional states and severe symptoms.⁴⁰ In a three-year prospective study of over 1,000 college students, alcohol-related sexual assault was associated with higher levels of alcohol use in the years both prior to and after the assault.¹⁶ Therefore, it is likely that prescription drug misuse and binge drinking are associated with unwanted sexual contact both before and after the incident occurs.

We found that reports of higher numbers of sexual partners and new sexual partners were associated with increased report of unwanted sexual contact. Previous research has suggested that women who are victims of sexual assault are more likely to engage in risky sexual behavior such as by increasing their number of sexual partners, in order to self-regulate the emotional distress caused by the sexual assault.^{41, 42} Engaging in sexual risk behavior, in turn, can increase susceptibility to further unwanted sexual

contact, potentially by increasing the likelihood of encountering a sexually aggressive partner.^{43, 44} Our study suggests that these findings might also apply to active duty military women.

Finally, we found that women who were married with their spouse present in the military were less likely than unmarried women and married women without their spouses present to have psychological distress associated with self-reported unwanted sexual contact. There are several potential explanations for this finding. First, military husbands might create a supportive community for their wives⁴⁵ and couples are thus better able to cope with sexual trauma or psychological distress. Perhaps women are better able to handle the distress caused by an unwanted sexual encounter by having a spouse present, or women with spouses present on the base could be less vulnerable to assault. Second, married women may experience unwanted sexual contact from their spouses, which could be less threatening than if experienced from military colleagues or strangers. Third, married women may be more likely to receive a basic housing allowance and to live off-base,⁴⁶ whereas single women living in barracks may be more susceptible to unwanted sexual contact. Finally, women who rank as officers as compared with enlisted were more likely to be married and may be less susceptible to unwanted sexual contact; however, the interaction between rank and psychological distress was not significant (data not shown).

Several limitations of this study should be taken into consideration. First, the data is susceptible to self-reporting bias. Active duty military personnel may be hesitant or unwilling to disclose sensitive information out of fear of punishment and therefore this type of information is likely to be underreported. However, this survey was conducted

anonymously via a paper questionnaire and measures were taken to encourage honest reporting. For example, neutral civilian teams collected the data and assured participants of data confidentiality, which may help to facilitate truthful responses. Second, this is a cross-sectional dataset and therefore causality cannot be established due to ambiguity surrounding the time-ordering of events. For example, we cannot be certain that the experience of unwanted sexual contact preceded screening positive for a mental health condition or vice versa. However, these relationships are likely to be bi-directional in nature. Because we conducted a secondary analysis of existing data, several variables may not perfectly capture the time frames for associations of interest. For example, respondents were asked to report binge drinking within the past 30 days whereas unwanted sexual contact was reported if it occurred since entering the military.

Implications for Practice and Policy

Because the prevalence of unwanted sexual contact was relatively high in our sample of active duty military women, screening for unwanted sexual contact and its associated health risks, such as mental health, should be a priority. Two-thirds of military women who reported unwanted sexual contact in 2012 did not report the incident to military authorities, and many stated the reason for not reporting was due to discomfort or belief that their report would not be kept confidential.³ Recent research conducted at military academies found that cadets who were sexually victimized had negative perceptions of military leadership, which can compromise the structure and function of military command.⁴⁷ Further, growing evidence suggests that the current reporting system for sexual assaults in the military is ineffective, particularly due to concerns surrounding confidentiality, negative reactions from peers or supervisors, fear

of negative career impact, and embarrassment or stigma.^{10, 33, 48} Thus, safe and effective reporting systems that reach beyond the military chain of command are encouraged. The factors influencing risk for unwanted sexual contact will become even more important to address as the proportion of women serving in the military increases.

Possible military prevention strategies to combat adverse mental health outcomes include suicide prevention education, resiliency training, and formal peer-based programs.^{49, 50} Because service members are exposed to high-intensity stressors including combat, the military has already established a culture that promotes service members taking care of one another.⁵¹ If peer-support programs are expanded to include mental health and in particular mental health issues related to unwanted sexual contact, this could potentially help to promote awareness and reduce stigma surrounding these issues. However, further research on peer support networks to reduce mental health burdens in relation to unwanted sexual contact is necessary.

Conclusions

We detected a high prevalence of unwanted sexual contact in this large sample of active duty military women. This has further implications for psychological well-being because indicators of current mental health status were associated with self-reports of unwanted sexual contact. In addition, unwanted sexual contact was associated with binge drinking and misuse of certain types of prescription drugs. Although we did not find an association between unwanted sexual contact and report of an STI, unwanted sexual contact was associated with report of new and multiple sexual partnerships. We suggest further research on peer-based, supportive mental health interventions and the adaption of safe, confidential reporting systems for report of unwanted sexual contact.

Table 3.1. Characteristics of sexually active women reporting unwanted sexual contact since entering the military, 2008 HRBS

<i>Characteristics</i>	Total women		Unwanted sexual contact		No unwanted sexual contact		p-value
	<u>n</u>	<u>% (SE)</u>	<u>n</u>	<u>% (SE)</u>	<u>n</u>	<u>% (SE)</u>	
All women	6701	100.0	915	12.4 (0.8)	5786	87.6 (0.8)	--
Demographics							
<i>Age, years</i>							
17-20	826	15.7 (1.5)	95	12.6 (1.7)	731	16.2 (1.7)	0.28
21-25	2373	36.7 (2.1)	360	40.6 (2.6)	2013	36.1 (2.2)	
26-34	2058	28.6 (0.8)	265	27.9 (2.1)	1793	28.7 (0.8)	
35 or older	1444	19.0 (2.8)	195	18.9 (2.0)	1249	19.0 (3.0)	
<i>Race/ethnicity</i>							
White	3596	53.4 (2.8)	580	65.7 (3.0)	3016	51.7 (2.8)	<0.001***
African American	1328	25.3 (2.6)	125	16.3 (2.1)	1203	26.6 (2.8)	
Hispanic	1054	11.2 (0.6)	126	9.1 (0.8)	928	11.5 (0.7)	
Other	723	10.1 (0.4)	84	9.0 (1.4)	639	10.2 (0.4)	
<i>Marital status¹</i>							
Unmarried	3385	53.9 (1.6)	515	61.9 (2.7)	2870	52.7 (1.6)	<0.001***
MSNP	520	8.8 (0.8)	60	6.4 (1.1)	460	9.2 (0.9)	
MSP	2727	37.3 (1.8)	329	31.7 (2.7)	2398	38.1 (1.9)	
<i>Pay grade</i>							
Enlisted	5306	81.4 (2.9)	745	83.4 (2.4)	4561	81.2 (3.1)	0.45
Officer	1395	18.6 (2.9)	170	16.6 (2.4)	1225	18.8 (3.1)	
<i>Service</i>							
Army	1427	36.1 (4.2)	155	32.7 (2.8)	1272	36.6 (4.6)	0.05*
Navy	1492	23.5 (3.6)	193	23.3 (3.2)	1299	23.5 (3.8)	
Marine Corps	1142	5.8 (0.8)	209	8.4 (1.4)	933	5.4 (0.7)	
Air Force	1891	32.0 (2.6)	234	32.3 (2.9)	1657	32.0 (2.8)	
Coast Guard	749	2.6 (0.4)	124	3.3 (0.6)	625	2.5 (0.4)	

<i>Deployed for combat, past 12 mo</i>							
Yes	1270	23.4 (3.4)	184	23.2 (3.9)	1086	23.4 (3.3)	0.91
No	5369	76.6 (3.4)	726	76.8 (3.9)	4643	76.6 (3.3)	
<i>Unwanted sexual contact before entering the military</i>							
Yes	2152	31.1 (1.3)	276	29.5 (2.2)	1876	31.3 (1.3)	0.35
No	4549	68.9 (1.3)	639	70.5 (2.2)	3910	68.7 (1.3)	
<i>Alcohol and Drug Use</i>							
<i>Binge drinking, past 30 d</i>							
Yes	1944	31.0 (1.1)	332	39.1 (2.6)	1612	29.8 (1.1)	<0.001***
No	4512	69.0 (1.1)	553	60.9 (2.6)	3959	70.2 (1.1)	
<i>Marijuana use, past 12 mo</i>							
Yes	244	3.8 (0.8)	32	3.0 (0.7)	212	4.0 (0.9)	0.44
No	6439	96.2 (0.8)	881	97.0 (0.7)	5558	96.0 (0.9)	
<i>Any illicit substance use besides marijuana, past 12 mo</i>							
Yes	155	2.5 (0.4)	29	2.9 (0.8)	126	2.5 (0.5)	0.71
No	6525	97.5 (0.4)	884	97.1 (0.8)	5641	97.5 (0.5)	
<i>Any Prescription drug misuse, past 12 mo</i>							
Yes	1303	20.8 (1.0)	189	22.3 (2.0)	1114	20.6 (1.1)	0.40
No	5381	79.2 (1.0)	724	77.7 (2.0)	4657	79.4 (1.1)	
<i>Stimulant misuse, past 12 mo</i>							
Yes	157	2.6 (0.3)	20	3.1 (1.1)	137	2.5 (0.4)	0.57
No	6524	97.4 (0.3)	893	96.9 (1.1)	5631	97.5 (0.4)	
<i>Tranquilizers/muscle relaxers misuse, past 12 mo</i>							
Yes	439	7.3 (0.6)	84	10.2 (1.2)	355	6.9 (0.6)	0.001**

No	6243	92.7 (0.6)	829	89.8 (1.2)	5414	93.1 (0.6)	
<i>Sedatives misuse, past 12 mo</i>							
Yes	225	3.6 (0.4)	45	5.2 (1.0)	180	3.3 (0.4)	0.03*
No	6456	96.4 (0.4)	867	94.8 (1.0)	5589	96.7 (0.4)	
<i>Painkillers misuse, past 12 mo</i>							
Yes	1212	19.4 (1.0)	171	19.8 (1.9)	1041	19.3 (1.1)	0.83
No	5472	80.6 (1.0)	743	80.2 (1.9)	4729	80.7 (1.1)	
<i>Steroids misuse, past 12 mo</i>							
Yes	80	1.4 (0.3)	10	1.1 (0.7)	70	1.5 (0.3)	0.71
No	6601	98.6 (0.3)	902	98.9 (0.7)	5699	98.5 (0.3)	
<i>Mental Health Indicators</i>							
<i>Depression, current</i>							
Yes	1752	26.1 (0.8)	358	39.8 (2.5)	1394	24.2 (0.8)	<0.001***
No	4865	73.9 (0.8)	546	60.2 (2.5)	4319	75.8 (0.8)	
<i>Anxiety, past 30 d</i>							
Yes	1278	19.5 (0.8)	274	27.0 (2.9)	1004	18.4 (0.9)	0.003**
No	5391	80.5 (0.8)	637	73.0 (2.9)	4754	81.6 (0.9)	
<i>PTSD, past 30 d</i>							
Yes	760	11.6 (0.5)	208	22.3 (2.1)	552	10.1 (0.5)	<0.001***
No	5903	88.4 (0.5)	704	77.7 (2.1)	5199	89.9 (0.5)	
<i>Overall stress, past 12 mo</i>							
Low	2859	42.4 (1.4)	277	29.4 (2.6)	2582	44.2 (1.4)	<0.001***
Moderate	2150	31.8 (0.9)	293	31.4 (2.5)	1857	31.8 (1.1)	
High	1670	25.8 (0.9)	343	39.2 (3.2)	1327	23.9 (0.8)	
<i>Family/Personal life-related stress, past 12 mo</i>							
None	1635	27.1 (1.0)	153	17.7 (1.9)	1482	28.4 (1.1)	<0.001***
Some/A little	3541	51.7 (0.8)	482	53.6 (1.6)	3059	51.4 (0.9)	

A lot	1479	21.3 (0.7)	272	28.6 (1.9)	1207	20.3 (0.8)	
<i>Military-related stress, past 12 mo</i>							
None	782	12.0 (0.6)	53	6.4 (1.0)	729	12.8 (0.6)	<0.001***
Some/A little	3849	57.0 (0.9)	485	51.5 (2.9)	3364	57.8 (1.0)	
A lot	2037	30.9 (1.0)	370	42.1 (2.9)	1667	29.4 (1.1)	
<i>Gender-related stress, past 12 mo</i>							
None	976	14.8 (0.7)	75	10.3 (1.3)	901	15.5 (0.7)	<0.001***
Some/A little	3061	45.9 (1.3)	346	39.6 (0.9)	2715	46.8 (1.3)	
A lot	2536	39.3 (1.2)	482	50.1 (1.3)	2054	37.7 (1.2)	
<i>Psychological distress, past 30 d</i>							
Yes	1375	20.2 (1.1)	304	33.1 (2.4)	1071	18.3 (1.0)	<0.001***
No	5310	79.8 (1.1)	608	66.9 (2.4)	4702	81.7 (1.0)	
<i>Suicide ideation, since entering military</i>							
Yes	372	5.3 (0.5)	106	11.7 (1.3)	266	4.4 (0.5)	<0.001***
No	6006	94.7 (0.5)	747	88.8 (1.3)	5259	95.6 (0.5)	
<i>Suicide attempt, since entering military</i>							
Yes	139	1.9 (0.3)	39	3.9 (0.6)	100	1.6 (0.3)	<0.001***
No	6354	98.1 (0.3)	837	96.1 (0.6)	5517	98.4 (0.3)	
<i>Sexual Risk Behaviors</i>							
<i>Condom use, last sexual encounter</i>							
Yes	1367	23.3 (0.9)	157	20.9 (2.1)	1210	23.7 (0.9)	0.22
No	4916	76.7 (0.9)	705	79.1 (2.1)	4211	76.3 (0.9)	
<i>No. sexual partners, past 12 mo</i>							
Five or more	394	5.9 (0.5)	97	11.0 (1.9)	297	5.2 (0.5)	<0.001***
Two to four	1545	25.0 (1.1)	267	33.7 (2.1)	1278	23.7 (1.0)	
One	4762	69.2 (1.4)	551	55.3 (2.3)	4211	71.1 (1.3)	
<i>No. of NEW sex partners,</i>							

past 12 mo

Two or more	1218	19.0 (1.2)	261	30.8 (2.2)	957	17.3 (1.1)	<0.001***
One	1252	21.6 (0.7)	183	25.6 (1.9)	1069	21.1 (0.7)	
None	4209	59.4 (1.2)	469	43.6 (2.5)	3740	61.6 (1.1)	

STI, past 12 mo

Yes	303	5.0 (0.4)	51	6.3 (1.1)	252	4.8 (0.4)	0.11
No	6373	95.0 (0.4)	859	93.7 (1.1)	5514	95.2 (0.4)	

¹MSP = Married, spouse present; MSNP = Married, spouse not present

*p<0.05; **p<0.01; ***p<0.001 P-values derived by Rao-Scott Chi-Square Test

Percentages shown are weighted; n's are unweighted

Percentages may not sum to 100 due to rounding

Table 3.2. Adjusted odds ratios¹ for the report of unwanted sexual contact among sexually active service women, 2008 HRBS dataset

<i>Mental health indicators</i>	Unwanted sexual contact	
	<u>AOR</u>	<u>95% CI</u>
<i>Depression, current</i>		
Yes	2.19	1.75, 2.75*
No	1.00	Reference
<i>Psychological Distress, past 30 d</i>		
Yes	2.21	1.76, 2.79*
No	1.00	Reference
<i>PTSD, past 30 d</i>		
Yes	2.80	2.09, 3.74*
No	1.00	Reference
<i>Anxiety, past 30 d</i>		
Yes	1.67	1.19, 2.35*
No	1.00	Reference
<i>Overall stress, past 12 mo</i>		
High	2.59	1.89, 3.53*
Moderate	1.47	1.11, 1.95*
Low	1.00	Reference
<i>Family/Personal life-related stress, past 12 mo</i>		
A lot	2.32	1.58, 3.39*
Some/A little	1.70	1.27, 2.28*
None	1.00	Reference
<i>Military-related stress, past 12 mo</i>		
A lot	2.65	1.88, 3.72*
Some/A little	1.62	1.13, 2.31*
None	1.00	Reference
<i>Gender-related stress, past 12 mo</i>		
A great deal/fairly large amount	2.10	1.38, 3.19*
Some/A little	1.25	0.84, 1.87
None	1.00	Reference
<i>Suicide ideation, since entering military</i>		
Yes	2.83	2.07, 3.87*
No	1.00	Reference
<i>Suicide attempt, since entering military</i>		
Yes	2.55	1.59, 4.11*
No	1.00	Reference
<i>Alcohol/Drug use</i>		
<i>Binge drinking, past 30 d</i>		
Yes	1.29	1.03, 1.63*

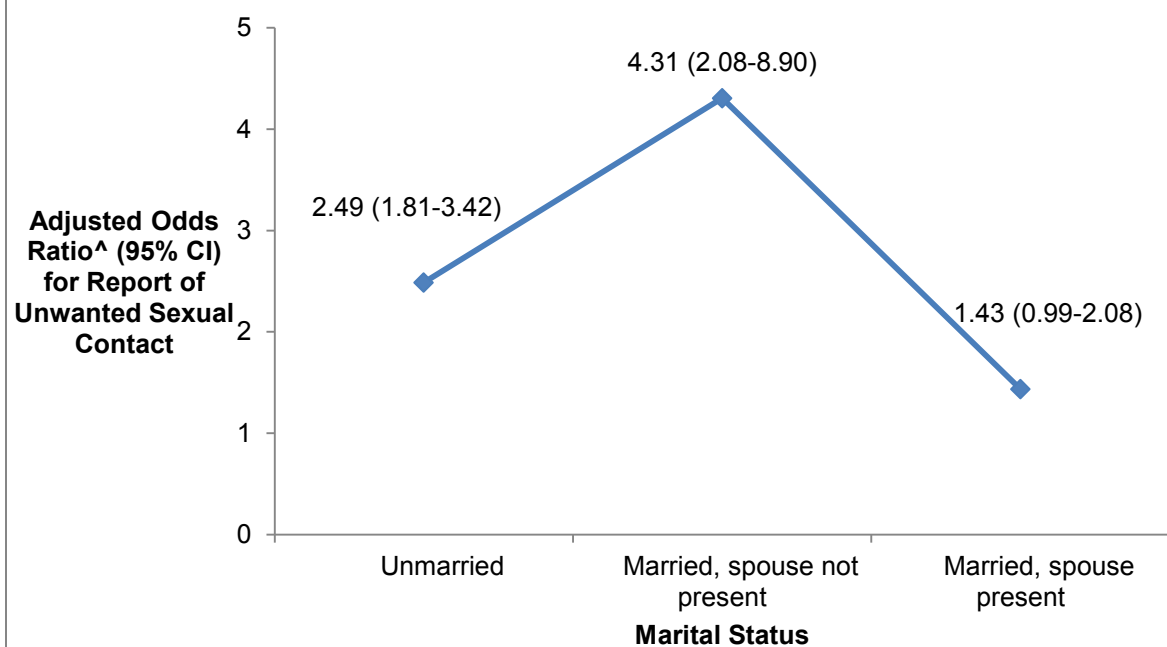
No	1.00	Reference
<i>Marijuana use, past 12 mo</i>		
Yes	0.78	0.40, 1.53
No	1.00	Reference
<i>Any illicit substance use besides marijuana, past 12 mo</i>		
Yes	1.19	0.62, 2.28
No	1.00	Reference
<i>Stimulant misuse, past 12 mo</i>		
Yes	1.26	0.52, 3.06
No	1.00	Reference
<i>Tranquilizers/muscle relaxers misuse, past 12 mo</i>		
Yes	1.58	1.22, 2.04*
No	1.00	Reference
<i>Sedatives misuse, past 12 mo</i>		
Yes	1.48	1.00, 2.20
No	1.00	Reference
<i>Painkillers misuse, past 12 mo</i>		
Yes	1.11	0.88, 1.39
No	1.00	Reference
<i>Steroids misuse, past 12 mo</i>		
Yes	0.79	0.21, 3.00
No	1.00	Reference
Sexual Risk Behaviors		
<i>Condom use, last sexual encounter</i>		
Yes	0.81	0.64, 1.02
No	1.00	Reference
<i>No. sexual partners, past 12 mo</i>		
Five or more	3.04	1.96, 4.69*
Two to four	1.85	1.52, 2.24*
One	1.00	Reference
<i>Any new sexual partners, past 12 mo</i>		
Yes	2.18	1.78, 2.69*
No	1.00	Reference
<i>STI, past 12 mo</i>		
Yes	1.30	0.91, 1.86
No	1.00	Reference

*p<0.05

Note: All variables entered in separate logistic regression models

¹Each multivariable logistic regression model controls for age, race/ethnicity, marital status, and unwanted sexual contact before entering the military

Figure 3.1. Interaction between psychological distress and marital status among sexually active service women



[^]Adjusts for age, race/ethnicity, and unwanted sexual contact before entering the military

3.6 References

1. Leardmann, C.A., A. Pietrucha, K.M. Magruder, et al., *Combat deployment is associated with sexual harassment or sexual assault in a large, female military cohort*. Womens Health Issues, 2013. **23**(4): p. e215-23.
2. Suris, A. and L. Lind, *Military sexual trauma - A review of prevalence and associated health consequences in veterans*. Trauma Violence & Abuse, 2008. **9**(4): p. 250-269.
3. Department of Defense, Workplace and Gender Relations Survey of Active Duty Members. (2012). Available at: <http://www.sapr.mil/index.php/research>.
4. Boyd, M.A., W. Bradshaw, and M. Robinson, *Mental Health Issues of Women Deployed to Iraq and Afghanistan*. Archives of Psychiatric Nursing, 2013. **27**(1): p. 10-22.
5. Dutra, L., K. Grubbs, C. Greene, et al., *Women at war: implications for mental health*. J Trauma Dissociation, 2011. **12**(1): p. 25-37.
6. McCauley, J.L., K.J. Ruggiero, H.S. Resnick, et al., *Incapacitated, forcible, and drug/alcohol-facilitated rape in relation to binge drinking, marijuana use, and illicit drug use: a national survey*. J Trauma Stress, 2010. **23**(1): p. 132-40.
7. Resnick, H.S., K. Walsh, J.L. McCauley, et al., *Assault related substance use as a predictor of substance use over time within a sample of recent victims of sexual assault*. Addict Behav, 2012. **37**(8): p. 914-21.
8. Decker, S.E., R.A. Rosenheck, J. Tsai, et al., *Military sexual assault and homeless women veterans: clinical correlates and treatment preferences*. Womens Health Issues, 2013. **23**(6): p. e373-80.
9. O'Brien, B.S. and L. Sher, *Military sexual trauma as a determinant in the development of mental and physical illness in male and female veterans*. Int J Adolesc Med Health, 2013. **25**(3): p. 269-74.
10. Turchik, J.A. and S.M. Wilson, *Sexual assault in the U.S. military: A review of the literature and recommendations for the future*. Aggression and Violent Behavior, 2010. **15**(4): p. 267-277.

11. Maguen, S, Cohen, B, Ren, L, et al., *Gender differences in military sexual trauma and mental health diagnoses among Iraq and Afghanistan veterans with posttraumatic stress disorder*. *Womens Health Issues*, 2012. **22**(1): p. 61-6.
12. Pavao, J., J.A. Turchik, J.K. Hyun, et al., *Military sexual trauma among homeless veterans*. *J Gen Intern Med*, 2013. **28 Suppl 2**: p. S536-41.
13. Street, A.E., J. Stafford, C.M. Mahan, et al., *Sexual harassment and assault experienced by reservists during military service: prevalence and health correlates*. *J Rehabil Res Dev*, 2008. **45**(3): p. 409-19.
14. Belik, S.L., M.B. Stein, G.J. Asmundson, et al., *Relation between traumatic events and suicide attempts in Canadian military personnel*. *Can J Psychiatry*, 2009. **54**(2): p. 93-104.
15. Kelly, T.M. and D.C. Daley, *Integrated treatment of substance use and psychiatric disorders*. *Soc Work Public Health*, 2013. **28**(3-4): p. 388-406.
16. Kaysen, D., C. Neighbors, J. Martell, et al., *Incapacitated rape and alcohol use: a prospective analysis*. *Addict Behav*, 2006. **31**(10): p. 1820-32.
17. Brecklin, L.R. and S.E. Ullman, *The roles of victim and offender substance use in sexual assault outcomes*. *J Interpers Violence*, 2010. **25**(8): p. 1503-22.
18. Turchik, J.A., J. Pavao, D. Nazarian, et al., *SEXUALLY TRANSMITTED INFECTIONS AND SEXUAL DYSFUNCTIONS AMONG NEWLY RETURNED VETERANS WITH AND WITHOUT MILITARY SEXUAL TRAUMA*. *International Journal of Sexual Health*, 2012. **24**(1): p. 45-59.
19. Turchik, J.A. and C.M. Hassija, *Female Sexual Victimization Among College Students: Assault Severity, Health Risk Behaviors, and Sexual Functioning*. *J Interpers Violence*, 2014.
20. Littleton, H.L., A.E. Grills-Taquechel, K.S. Buck, et al., *Health Risk Behavior and Sexual Assault Among Ethnically Diverse Women*. *Psychol Women Q*, 2013. **37**(1): p. 7-21.

21. Gibb, S.J., D.M. Fergusson, and L.J. Horwood, *Relationship duration and mental health outcomes: findings from a 30-year longitudinal study*. Br J Psychiatry, 2011. **198**(1): p. 24-30.
22. Scott, K.M., J.E. Wells, M. Angermeyer, et al., *Gender and the relationship between marital status and first onset of mood, anxiety and substance use disorders*. Psychol Med, 2010. **40**(9): p. 1495-505.
23. Kimerling, R., K. Gima, M.W. Smith, et al., *The Veterans Health Administration and military sexual trauma*. Am J Public Health, 2007. **97**(12): p. 2160-2166.
24. RTI International. (2009). *2008 Department of Defense Survey of Health Related Behaviors Among Active Duty Military Personnel*. Available at www.tricare.mil/tma/2008HealthBehaviors.pdf.
25. Witt, M.B., K.L.R. Olmsted, K. Spagnola, et al., 2008 Department of Defense Survey of Health Related Behaviors Among Active Duty Military Personnel: Codebook for the Public Use File. (2009).
26. Bray, R.M., M.R. Pemberton, M.E. Lane, et al., *Substance use and mental health trends among U.S. military active duty personnel: key findings from the 2008 DoD Health Behavior Survey*. Mil Med, 2010. **175**(6): p. 390-9.
27. Kessler, R.C., G. Andrews, L.J. Colpe, et al., *Short screening scales to monitor population prevalences and trends in non-specific psychological distress*. Psychol Med, 2002. **32**(6): p. 959-76.
28. Weathers, F., B. Litz, J. Huska, et al. The PTSD Checklist-Civilian Version (PCL-C). 1994. Available at: www.mirecc.va.gov/docs/visn6/3_PTSD_CheckList_and_Scoring.pdf. Accessed April 7, 2013.
29. Spitzer, R.L., K. Kroenke, J.B.W. Williams, et al., *Validation and utility of a self-report version of PRIME-MD - The PHQ primary care study*. Jama-Journal of the American Medical Association, 1999. **282**(18): p. 1737-1744.
30. Rao, J.N.K. and A.J. Scott, *On Chi-Squared Tests for Multiway Contingency Tables with Cell Proportions Estimated from Survey Data*. The Annals of Statistics, 1984. **12**(1): p. 46-60.

31. National Center for Injury Prevention and Control, Centers for Disease Control and Prevention. (2011). *The National Intimate Partner and Sexual Violence Survey (NISVS): 2010 Summary Report*, Atlanta, GA. Available at www.cdc.gov/violenceprevention/pdf/nisvs_report2010-a.pdf.
32. Murdoch, M., J.B. Pryor, M.A. Polusny, et al., *Functioning and psychiatric symptoms among military men and women exposed to sexual stressors*. *Mil Med*, 2007. **172**(7): p. 718-25.
33. Burns, B., K. Grindlay, K. Holt, et al., *Military sexual trauma among US servicewomen during deployment: a qualitative study*. *Am J Public Health*, 2014. **104**(2): p. 345-9.
34. Rossiter, A.G. and S. Smith, *The invisible wounds of war: Caring for women veterans who have experienced military sexual trauma*. *J Am Assoc Nurse Pract*, 2013.
35. Novik, M.G., D.E. Howard, and B.O. Boekeloo, *Drinking motivations and experiences of unwanted sexual advances among undergraduate students*. *J Interpers Violence*, 2011. **26**(1): p. 34-49.
36. (2007). *NIJ Grant No 2005-WG-BX-0006. Drug-facilitated, Incapacitated, and Forcible Rape: A National Study. Final Report submitted July, 2007*.
37. Weir, E., *Drug-facilitated date rape*. *CMAJ*, 2001. **165**(1): p. 80.
38. Ullman, S.E. and C.J. Najdowski, *Revictimization as a moderator of psychosocial risk factors for problem drinking in female sexual assault survivors*. *J Stud Alcohol Drugs*, 2009. **70**(1): p. 41-9.
39. Grattan, A., M.D. Sullivan, K.W. Saunders, et al., *Depression and prescription opioid misuse among chronic opioid therapy recipients with no history of substance abuse*. *Ann Fam Med*, 2012. **10**(4): p. 304-11.
40. Pettersen, H., T. Ruud, E. Ravndal, et al., *Walking the fine line: Self-reported reasons for substance use in persons with severe mental illness*. *Int J Qual Stud Health Well-being*, 2013. **8**: p. 21968.

41. Littleton, H.L., A.E. Grills-Taquechel, K.S. Buck, et al., *Health Risk Behavior and Sexual Assault Among Ethnically Diverse Women*. Psychol Women Q, 2013. **37**(1): p. 7-21.
42. Orcutt, H.K., M.L. Cooper, and M. Garcia, *Use of sexual intercourse to reduce negative affect as a prospective mediator of sexual revictimization*. J Trauma Stress, 2005. **18**(6): p. 729-39.
43. Senn, T.E., M.P. Carey, and P.A. Vanable, *Childhood and adolescent sexual abuse and subsequent sexual risk behavior: evidence from controlled studies, methodological critique, and suggestions for research*. Clin Psychol Rev, 2008. **28**(5): p. 711-35.
44. Testa, M., J.H. Hoffman, and J.A. Livingston, *Alcohol and sexual risk behaviors as mediators of the sexual victimization-revictimization relationship*. J Consult Clin Psychol, 2010. **78**(2): p. 249-59.
45. Benjamin R. Karney and J.S. Crown. *Families under stress: An assessment of data, theory, and research on marriage and divorce in the military*. 2007. Available at: www.rand.org.
46. *Department of Defense Housing Management Manual. Number 4165.63-M. October 28, 2010*. Available at <http://www.acq.osd.mil/housing/housing101.htm>.
47. Snyder, J.A., B.S. Fisher, H.L. Scherer, et al., *Unsafe in the camouflage tower: sexual victimization and perceptions of military academy leadership*. J Interpers Violence, 2012. **27**(16): p. 3171-94.
48. Steiger, D., M. Chattopadhyay, M. Roa, et al., *Findings from the 2010 prevalence/incidence survey of sexual assault in the Air Force*. (2010). Available at: <http://www.afpc.af.mil/shared/media/document/AFD-110317-008.pdf>.
49. Pfeiffer, P.N., A.J. Blow, E. Miller, et al., *Peers and peer-based interventions in supporting reintegration and mental health among National Guard soldiers: a qualitative study*. Mil Med, 2012. **177**(12): p. 1471-6.
50. Callahan, D.J., *Combat-related mental health disorders: the case for resiliency in the long war*. J Am Osteopath Assoc, 2010. **110**(9): p. 520-7.

51. Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury. (2011). *Best Practices Identified for Peer Support Programs*. Available at http://www.dcoe.mil/content/Navigation/Documents/Best_Practices_Identified_for_Peer_Support_Programs_Jan_2011.pdf.

Chapter 4. A Comparison of Self-Reported Sexual Risk Behaviors between Civilian and Active Duty Military Women

4.1 Abstract

Background. Women in the military report a high prevalence of sexual risk behaviors. However, demographic differences pose challenges to making comparisons with civilians.

Methods. We used data from the 2008 Department of Defense Survey of Health Related Behaviors among Active Duty Military Personnel (n=6,314) and the 2007-2010 National Health and Nutrition Examination Survey (n=1,410) to estimate and compare adjusted prevalence of sexual risk behaviors using 95% confidence intervals.

Multivariable logistic regression was used to determine factors associated with report of a recent sexually transmitted infection (STI).

Results. Overall, women in the military reported a higher prevalence of binge drinking and new/multiple sexual partners as compared with civilians, yet there was variation by age and race/ethnicity. In particular, binge drinking was more prevalent among military women among Blacks but not among Whites or Hispanics. Military women aged 20-25 years more frequently reported a new sexual partner in the past 12 months as compared with civilian women in the same age group. In the final multivariable models, we identified several demographic factors and risk behaviors associated with recent report of an STI among military women and with recent report/laboratory diagnosis of an STI among civilian women.

Conclusion. The military environment may facilitate risky behaviors such as binge drinking and new and multiple sexual partners. STI risk behavior intervention strategies should be tailored to be specific for different age and ethnic groups of service women.

4.2 Introduction

The proportion of women serving in the military has increased dramatically since the 1970s, with over 203,000 women or 14.4% of all active duty forces serving in 2010¹ as compared with 7,000 during the Vietnam era.² Women in the active duty U.S. military are exposed to an environment where a high prevalence of sexual risk behaviors such as binge drinking, multiple sexual partners and infrequent condom use exist,³⁻⁵ which may contribute to risk for sexually transmitted infections (STIs). One recent study comparing women veterans to non-veterans found that women veterans reported a younger age at first intercourse, a greater number of lifetime sexual partners, and an increased likelihood of genital herpes and genital warts.⁶ In addition, a large proportion of active duty women are at a higher risk for STIs due to their demographic characteristics such as being of a younger age, unmarried, and of Black race/ethnicity,¹ which are risk factors for STI acquisition in the general population.⁷⁻⁹ It is currently unclear whether differences in prevalence of risk behaviors are due to military social and environmental factors or because most women in the military represent the demographic at risk. Adjustment for demographic factors may enhance comparative analyses and provide insight into the level of risk practiced and experienced by women in the military.

The prevalence of STIs such as chlamydia and gonorrhea among asymptomatic military women ranges from 5-10%¹⁰⁻¹² as compared to 2-5% in the general population of young adult women.^{9, 13} However, it is difficult to compare self-reported STI rates between military and civilian women because chlamydia testing for military women less than 26 years of age is performed in all service branches at the female wellness

encounter, which is performed prior to completion of Advanced Individual Training or Basic Officer Leader Course Phase 3,^{14, 15} whereas in the general population women may only be tested if they have access to and seek this health care service. In order to clarify whether STI prevalence is truly higher among military women or if it is due to screening bias, it might be useful to compare military women with women in the general population who have also been recently screened for STIs such as chlamydia.

We created a demographically comparable sub-population of civilian women using data from the most recent National Health and Nutrition Examination Survey (NHANES) in order to compare prevalence of sexual risk behaviors (such as number of sexual partners and binge drinking) and self-reported STIs between women in the military and civilian women. Prevalence estimates within NHANES were standardized to the military population with respect to age, race/ethnicity, education level, and marital status. We also calculated adjusted prevalence estimates stratified by age and race/ethnicity to determine differences in prevalence estimates between these subgroups. The women sampled in NHANES would have been eligible for service during the same time period as the group of women sampled in the 2008 Department of Defense Survey of Health Related Behaviors among Active Duty Military Personnel (HRBS). We hypothesized that prevalence of reported binge drinking and number of sexual partners would be higher among women in the military as compared with women in the general population. We further hypothesized that STI prevalence would be higher among military women.

4.3 Methods

Study population and design

We used data from the 2007-2010 NHANES to estimate the prevalence of sexual risk behaviors and STIs among civilian women. The NHANES is a multistage cross-sectional probability sample that was designed to be representative of the civilian, non-institutionalized U.S. population.¹⁶ Personal interview data on drug use were collected for participants aged 20 years or older in 2007-2008 and aged 18 years or older in 2009-2010 using Audio Computer Assisted Self Interview (ACASI) system. Sexual behavior data for participants aged 20 years or older were also collected using ACASI. NHANES questions about alcohol use were administered to participants aged 20 years or older using Computer-Assisted Personal Interviewing (CAPI) system. Unweighted response rates for women of all ages ranged from 78.6% in the 2007-2008 NHANES to 79.7% in 2009-2010. NHANES was selected for comparison with the HRBS over other public use general population datasets such as the National Survey of Drug Use and Health, the National Health Interview Survey, the Behavioral Risk Factor Surveillance System, and the National Survey of Family Growth because NHANES included more comparable survey questions regarding demographics, alcohol use, drug use, and sexual behavior.

In order to estimate the prevalence of sexual risk behaviors and STIs among women in the military, we used existing data from the 2008 HRBS public use data file, which was obtained by the study investigators in October 2012. Briefly, the 2008 HRBS was a self-administered, anonymous paper questionnaire that consisted of a random stratified sample of all Army, Navy, Marine Corps, Air Force, and Coast Guard personnel on active duty during the time of data collection (May – July 2008).¹⁷ Sampling methods are described elsewhere.^{17, 18} The survey took approximately one

hour to complete and the overall response rate was 71.6%.¹⁷ Institutional Review Board approval for data collection was obtained from RTI International and Department of Defense.

There were a total of 2,286 sexually active women aged 20-49 years in our NHANES sample. From this sample, we excluded women who were unemployed (n=790), HIV positive (n=4), and military veterans (n=31). In addition, women aged 20-30 years who had a military-disqualifying health condition including current asthma or bronchitis, arthritis, congestive heart failure, emphysema, or a cancer/malignancy were excluded from the NHANES sample (n=51). The final study sample consisted of 1,410 sexually active women aged 20-49 years in the NHANES and 6,314 sexually active women aged 20-49 years in the HRBS. We defined sexually active as having reported at least one sexual partner within the past 12 months.

Key Measures

Variables used for comparison between HRBS and NHANES datasets, including original wording of questions and variable re-coding information, are provided in Table 4.1.

Statistical analysis

Prevalence and 95% confidence intervals for specific characteristics such as sexual risk behaviors and reported STI rates were calculated separately for the military and civilian samples. Within the NHANES sample, the prevalence estimate for each characteristic was standardized to the military population with respect to age (20-25

years, 26-34 years, or 35-49 years), race/ethnicity (White, Black, Hispanic, or Other), education (high school or less, some college, or college or more), and marital status (married or unmarried). If the 95% confidence intervals for a specific characteristic did not overlap between the NHANES and HRBS samples, we considered this to be a statistically significant ($p < 0.01$)¹⁹ difference between the two samples. For all analyses, SAS survey procedures were used in order to take complex sampling design into consideration.

4.4 Results

Prevalence of Sexual Risk Behaviors/STIs

There were a total of 6,314 female military personnel and 1,410 civilian women included in our analysis. Overall, a similar proportion of military (83%) and civilian (83%) women reported drinking any alcohol in the past 12 months. The average number of drinks reported per day and the number of times or days spent drinking were also similar among military personnel and civilians. However, more military women reported binge drinking in the past 12 months (45.3%; 95% Confidence Interval [CI]=42.8, 47.8 vs. 35.9%; 95% CI=32.2, 39.7). Reported illicit substance use was higher in the civilian sample, with 23% of civilian women reporting marijuana use in the past 12 months as compared with 3% of military women.

Civilian women reported fewer sexual partners in the past 12 months, with 77% (95% CI=73.3, 81.0) reporting only one sexual partner compared with 71% (95% CI=68.3, 73.1) of military women. In contrast, 29.3% (95% CI=26.9, 31.7) of military women reported two or more sexual partners compared with 22.9% (95% CI=19.0,

26.7) of civilian women. In addition, report of any new sexual partners in the past 12 months was more common for military (38.7%; 95% CI=36.6, 40.9) as compared with civilian (21.1%; 95% CI=15.5, 26.7) women. The self-report of any STI within the past 12 months among military women (4.9%; 95% CI=4.0, 5.8) was similar to that of civilians (who reported on chlamydia/gonorrhea in the past 12 months and genital herpes ever) (6.9%, 95% CI=4.4, 9.3). When we expanded the civilian estimate of STI prevalence to include laboratory diagnosis of chlamydia for women aged 25 years and younger, as well as any self-report of chlamydia/gonorrhea in the past 12 months or any self-report of genital herpes ever, the adjusted prevalence was 7.93% (95% CI=5.20, 10.7) (data not shown).

Prevalence of Sexual Risk Behaviors by Age and Race/ethnicity

After stratifying by age and race/ethnicity (and continuing to adjust for education and marital status), the prevalence of binge drinking was significantly higher among military as compared with civilian women only among those who identified as Black (Table 4.4; Fig. 4.1). The prevalence of any new sexual partners in the past 12 months was significantly higher for military as compared with civilian women in every strata except for Hispanic women aged 26 or older and White women aged 35-49 years. In addition, the report of two or more sexual partners within the past 12 months was more prevalent for Hispanic women aged 20-25 years (42.5% vs. 25.8%) as compared with civilians in the same age/race/ethnicity strata. In contrast, military women had lower rates of reported illicit substance use. We found that marijuana use in the past 12 months was

lower for military women of all racial/ethnic groups in all age strata except for Hispanic women aged 26-34 years and 35 years or older.

Binge Drinking and New and Multiple Partnerships

In both military and civilian groups, women who reported binge drinking also reported a higher proportion of new and multiple sexual partners within the past 12 months, as compared with those who did not report binge drinking (Fig. 4.2). The proportion of military service women who reported five or more sexual partners was 8.2% among binge drinkers and 2.7% among non-binge drinkers. Among civilian women, the proportion who reported five or more sexual partners was 6.2% among binge drinkers and 2.0% among non-binge drinkers. Similarly, 51.9% and 28% of military women and 30.6% and 15.7% of civilian women reported any new sex partners in the past 12 months, among binge drinkers and non-binge drinkers, respectively. Military women were more likely than civilians to report any new sex partner among both binge drinkers and non-binge drinkers.

Factors Associated with Report of an STI

In two multivariable logistic regression models controlling for age, race/ethnicity, education, and marital status, we found that the past year reported number of sexual partners, binge drinking, and use of cocaine, heroin, or methamphetamine were significantly associated with report of a recent STI among military women (Table 4.5). Among civilian women, report of marijuana use within the past 12 months was significantly associated with the recent report or laboratory diagnosis of an STI. In

addition, report of Black race/ethnicity was significantly associated with recent report of an STI among military women (Adjusted Odds Ratio [AOR]=2.27, 95% Confidence Interval [CI]=1.38, 3.72) and with recent report/laboratory diagnosis of an STI among civilian women (AOR=5.07, 95% CI=3.61, 7.12).

4.5 Discussion

This study compares STI and sexual risk behavior prevalence between military and civilian women. Previous comparisons have relied on data from national surveys such as the Behavioral Risk Factor Surveillance System²⁰ or the Youth Risk Behavior Survey,²¹ and do not adjust for potentially confounding factors such as age and race/ethnicity nor exclude women who would be ineligible for military service. By using data from NHANES to create a demographically comparable group of civilian women, we were able to make comparisons between service women and civilian women in terms of sexual risk factors and to determine which age and racial/ethnic groups were at highest risk of engaging in those behaviors. This is important information for determining whether service women are a truly high-risk group and for identifying subgroups of women at greatest risk.

For alcohol use, we found that more military as compared with civilian women reported recent binge drinking. After stratifying by age and race/ethnicity, young Black military women had almost double the prevalence of binge drinking as compared with civilians. Young Hispanic women also had an increased prevalence of binge drinking, although there was some overlap of 95% confidence intervals. A previous study conducted among active duty personnel suggested those who were younger and

Hispanic were among the highest-risk subgroups for binge drinking.²² In the general population, Black and Hispanic adolescents tend to initiate alcohol consumption at a later age than White adolescents, although the reasons for this are not fully understood.²³ Perhaps the military environment influences these cultural perceptions of binge drinking and promotes binge drinking at a young age for all racial/ethnic groups. In our analysis, although White women reported a high prevalence of binge drinking, the differences between military and civilian estimates were most notable among Blacks across all age groups. However, because the prevalence of binge drinking within the military was highest among those aged 20-25 years, military intervention efforts to reduce binge drinking may have the greatest impact by targeting younger service women.

Young service women, particularly those aged 20-25 years, reported higher numbers of sexual partners and new sexual partners as compared with civilian women. Specifically, women in the military were more likely to report a new recent sexual partner.. One possible explanation for this high prevalence of new and/or multiple partnerships includes the widespread availability of potential sex partners. This could also partially explain why the prevalence in our sample was similar to that of college women,²⁴ who may be in an environment that is similar to the military in terms of living arrangements (i.e., dormitories), demographics (a high proportion of young, unmarried adults), and easy access to alcohol. In particular, binge drinking may contribute to the high proportion of women reporting new and multiple sexual partners.^{25, 26} We confirmed that among both military and civilian women, the proportion of women reporting new and multiple sexual partners was higher among binge drinkers as compared with non-

binge drinkers. However, we also found that among both binge drinkers and non-binge drinkers, military women were more likely than civilians to report any new sex partners, which suggests that other aspects of the military environment aside from drinking could facilitate increased numbers of new sexual partnerships.

There are several limitations of this study to consider. Comparisons between data sets must be done with caution as differences in phrasing of questions and different survey methodology can lead to different types of responses. In particular, binge drinking was measured differently in the NHANES and HRBS. Only extreme binge drinking episodes (eight or more drinks in a single day) were captured between the previous 30 days and 12 months for military women, which could partially explain the association between binge drinking and report of an STI that was detected among military but not civilian women. However, this suggests that military binge drinking estimates could be even higher than estimated or that military women engage in more extreme forms of binge drinking. We used a conservative method of comparing differences in prevalence between NHANES and HRBS, because the p-value for non-overlapping 95% confidence intervals is considerably smaller than 0.05,¹⁹ which further indicates a difference in prevalence between military and civilian women.

An additional limitation is that the HRBS and NHANES surveys draw from different source populations in the United States, which limits the ability of making valid comparisons. For example, military personnel tend to be recruited from the Southern and Western U.S.,²⁷ however, we were unable to adjust for this in our estimates. Women in the military also tend to be healthier than women in the general population, which could be associated with certain types of risk behavior (i.e., adolescents with a

chronic illness may be less likely to use illicit substances²⁸). Because of this, we excluded young women from the NHANES sample who had certain military-disqualifying health conditions . Furthermore, both NHANES and HRBS surveys are based on cross-sectional and self-reported measures of sensitive topics, such as condom use and substance use. This may be particularly problematic in a military population because substance use as well as sexual activity is highly discouraged during deployment,²⁹ which could lead to underreporting because respondents may be unwilling to share sensitive information out of fear of disciplinary consequences for disclosing such information. However, the HRBS was conducted anonymously via a paper questionnaire and measures were taken to encourage honest reporting. For example, neutral civilian teams collected the data and assured participants of data confidentiality, which may have helped to facilitate truthful responses. Finally, because women in the military under 26 years of age are actively screened for chlamydia,¹⁵ we used a combination of laboratory-based and self-reported test results for comparing women in the NHANES sample to women in the HRBS in order to minimize screening bias in our results. However, the HRBS questionnaire did not ask about report of specific STIs and lacked laboratory diagnoses, which is an additional limitation to using existing data.

Despite limitations, the results of this analysis help to clarify the differences in prevalence of risk behaviors among civilian and military women. Although these comparisons are not perfect, they are based on the best available data for public-use. In order to facilitate comparisons between NHANES and HRBS, we standardized the NHANES prevalence estimates to the HRBS military population distribution, adjusting

for age, race/ethnicity, education level, and marital status. Our analysis suggests that the military environment facilitates risky behaviors such as binge drinking and new and multiple sexual partnerships, which could place service women at higher risk for STIs. Because prevalence of risk behavior varies among age and racial/ethnic groups, military STI intervention strategies should be designed with these demographic differences taken into consideration.

Table 4.1. Variables compared across 2007-2010 NHANES and 2008 HRBS data sets

Variable	NHANES source	Type	HRBS source	Type
Drinker	In the past 12 months, how often did you drink any type of alcoholic beverage? PROBE: How many days per week, per month, or per year did you drink?	Re-coded to Categorical, Dichotomous: had at least 1 drink, had 0 drinks	Multiple questions; If the respondent reports any number of alcoholic drinks within in the past 12 months they are categorized as a drinker	Re-coded to Categorical, Dichotomous: 1+ drinks, I don't drink

Binge drinking	In the past 12 months, on how many days did you have 5 or more drinks of any alcoholic beverage? PROBE: How many days per week, per month, or per year did you have 5 or more drinks in a single day?	Re-coded to Categorical, Dichotomous: 1+ binge drinking episodes, no binge drinking episodes	During the past 30 days, on how many days did you have 5 or more drinks of beer, wine, or liquor on the same occasion (4 or more if you are a woman)? (By "drink," we mean a bottle or can of beer, a wine cooler or a glass of wine, a shot of liquor, or a mixed drink or cocktail. By "occasion," we mean at the same time or within a couple of hours of each other.) [or] During the past 12 months, how often did you drink 8 or more cans, bottles, or glasses of beer (3 quarts or more) in a single day? [or] During the past 12 months, how often did you drink 8 or more glasses of wine (more than a standard wine bottle) in a single day? [or] During the past 12 months, how often did you drink 8 or more drinks of liquor (a half-pint or more) in a single day?	Re-coded to Categorical, Dichotomous: 1+ binge drinking episodes, no binge drinking episodes
Avg. no. of drinks per day (among drinkers)	In the past 12 months, on those days that you drank alcoholic beverages, on the average, how many drinks did you have?	Re-coded to Categorical, Multiple Outcomes: 10 or more, 7 to 9, 5 or 6, 3 or 4, 1 or 2	How many drinks containing alcohol do you have on a typical day when you are drinking?	Categorical, Multiple Outcomes: 10 or more, 7 to 9, 5 or 6, 3 or 4, 1 or 2

How often drink alcohol (among drinkers)	In the past 12 months, how often did you drink any type of alcoholic beverage? PROBE: How many days per week, per month, or per year did you drink?	Re-coded to Categorical, Multiple Outcomes: Four or more times a week, two to three times a week, two to four times a month, monthly or less	How often do you have a drink containing alcohol? [Those who answered "Never" were assigned a missing value]	Categorical, Multiple Outcomes: Four or more times a week, two to three times a week, two to four times a month, monthly or less
Marijuana use, past 12 months	How long has it been since you last used marijuana or hashish?	Re-coded to Categorical, Dichotomous: used in the past 12 months, not used in the past 12 months	When did you last use marijuana or hashish?	Re-coded to Categorical, Dichotomous: used in the past 12 months, not used in the past 12 months
Cocaine, heroin, or methamphetamine use, past 12 months	How long has it been since you last used cocaine, in any form? How long has it been since you last used heroin? How long has it been since you last used methamphetamine?	Re-coded to Categorical, Dichotomous: used in the past 12 months, not used in the past 12 months	When did you last use cocaine (including crack)? When did you last use heroin? When did you last use methamphetamine?	Re-coded to Categorical, Dichotomous: used in the past 12 months, not used in the past 12 months
Condom use	In the past 12 months, how often have you had [vaginal or anal] sex without using a condom?	Re-coded to Categorical, Dichotomous: any use in the past 12 months, never used in the past 12 months	The last time you had sex, did you or your sex partner use a condom?	Categorical, Dichotomous: yes, no

No. sexual partners, past 12 months	In the past 12 months, with how many men have you had any kind of sex? In the past 12 months, with how many women have you had sex?	Re-coded to Categorical, Multiple Outcomes: Five or more partners, 2-4 partners, 1 partner	In the past 12 months, how many people have you had sex with?	Categorical, Multiple Outcomes: Five or more partners, 2-4 partners, 1 partner
Any new sexual partners, past 12 months	In the past 12 months did you have any kind of sex with a person that you never had sex with before? [only in 2009-2010 NHANES only]	Categorical, Dichotomous: yes, no	How many new sex partners did you have during the past 12 months? A new sex partner is someone you had sex with for the first time in the past 12 months.	Re-coded to Categorical, Dichotomous: 1+ new partners, no new partners
Self-reported STI	In the past 12 months, has a doctor or other health care professional told you that you had gonorrhea, sometimes called GC or clap? [or] In the past 12 months, has a doctor or other health care professional told you that you had chlamydia? [or] Has a doctor or other health care professional ever told you that you had genital herpes?	Re-coded to Categorical, Dichotomous: yes to any, no to all	Have you ever had a sexually transmitted disease, such as gonorrhea, syphilis, chlamydia, or genital herpes?"	Re-coded to Categorical, Dichotomous: yes in the past 12 months, no not in the past 12 months

Table 4.2. Prevalence of behaviors/characteristics among women in the NHANES and HRBS data sets

<i>Characteristics</i>	2007-2010 NHANES¹ (n=1,410)			2008 HRBS² (n=6,314)		
	<u>n</u>	<u>%</u>	<u>95% CI</u>	<u>n</u>	<u>%</u>	<u>95% CI</u>
Alcohol Use						
<i>Drinker, past 12 months</i>	1096	83.3	(80.6, 86.1)	5199	82.6	(81.0, 84.2)
<i>Binge drinking, past 12 months</i>	398	35.9	(32.2, 39.7)	2702	45.3	(42.8, 47.8)^
<i>Avg. no. of drinks per day, among drinkers</i>						
1-2	676	61.1	(56.0, 66.2)	3157	62.5	(59.7, 65.3)
3-4	289	26.4	(21.9, 30.9)	1119	23.8	(22.1, 25.5)
5-6	96	8.3	(5.3, 11.3)	421	9.1	(7.9, 10.2)
7-9	22	2.7	(1.0, 4.4)	160	3.0	(2.2, 3.8)
10+	14	1.5	(0.1, 3.0)	81	1.7	(1.2, 2.1)
<i>How often drink alcohol, among drinkers</i>						
Monthly or less	494	43.8	(39.6, 48.0)	1761	40.8	(38.6, 43.0)
2-4 times per month	332	31.5	(27.4, 35.6)	1399	32.8	(30.6, 35.0)
2-3 times per week	180	20.4	(16.2, 24.5)	856	19.3	(17.4, 21.2)
4 or more times per week	74	4.4	(2.0, 6.8)	322	7.1	(6.3, 8.0)
Drug Use						
<i>Illicit substance use, past 12 months</i>						
Marijuana	231	23.0	(19.0, 27.0)^	198	3.1	(2.0, 4.2)
Cocaine/heroin/meth	33	3.4	(1.8, 5.1)^	79	1.3	(0.9, 1.7)
Sexual Risk Behavior						
<i>Condom use</i>						
At last sex	--	--	--	1256	22.6	(20.8, 24.4)
Any in past 12 months	661	53.6	(48.9, 58.2)	--	--	--
Always/more than half the time in past 12 months	452	31.3	(26.6, 36.1)	--	--	--
<i>No. sexual partners, past 12 months</i>						
One partner	1165	77.1	(73.3, 81.0)^	4573	70.7	(68.3, 73.1)
2+ partners	245	22.9	(19.0, 26.7)	1741	29.3	(26.9, 31.7)^
<i>Any new sexual partners, past 12 months (2009-10 only)</i>	115	21.1	(15.5, 26.7)	2230	38.7	(36.6, 40.9)^

Self-Reported STIs

<i>STI, past 12 months</i>	--	--	--	274	4.9	(4.0, 5.8)
<i>STI, ever</i>	--	--	--	1433	22.4	(21.3, 23.5)
<i>CT, past 12 months</i>	17	1.7	(0.55, 2.9)	--	--	--
<i>GC, past 12 months</i>	5	0.5	(0, 0.9)	--	--	--
<i>CT/GC, past 12 months</i>	19	1.9	(0.7, 3.1)	--	--	--
<i>HSVII, ever</i>	60	5.1	(3.0, 7.2)	--	--	--
<i>CT/GC past 12 months or HSVII ever</i>	76	6.9	(4.4, 9.3)	--	--	--

Laboratory Diagnosed STIs

<i>CT</i>	16	1.9	(0.6, 3.2)	--	--	--
<i>GC (2007-08 only)</i>	0	--	--	--	--	--
<i>HSVII</i>	374	20.8	(17.7, 24.0)	--	--	--

Combined Laboratory/Self-Reported STIs

<i>CT</i>	32	3.5	(1.5, 5.5)	--	--	--
<i>CT/GC</i>	34	3.7	(1.7, 5.7)	--	--	--
<i>HSVII</i>	391	20.6	(17.4, 23.8)	--	--	--
<i>CT/GC/HSVII</i>	411	23.0	(19.6, 26.4)	--	--	--

n's are unweighted; percentages are weighted

^a95% confidence intervals for the prevalence do not overlap

Note: NHANES prevalence estimates are standardized to the military population with respect to age, race/ethnicity, education, and marital status

¹Includes sexually active women aged 20-49 years; excluding military veterans, women who were HIV positive, unemployed women, and women with a military-disqualifying health condition including asthma or bronchitis, arthritis, congestive heart failure, emphysema, or a cancer/malignancy

²Includes sexually active women aged 20-49 years

Table 4.3. Prevalence of behaviors/characteristics of active duty military women in the 2008 HRBS¹ and civilian women in the 2007-2010 NHANES², stratified by age and race/ethnicity

Ages 20-25 years (HRBS n=2,873; NHANES n=247)						
	White		Black		Hispanic	
	%	95% CI	%	95% CI	%	95% CI
Alcohol/Drug Use						
<i>Binge drinking, past 12 mo</i>						
HRBS	58.7	(55.4, 62.1)	45.7	(39.3, 52.2)^	50.9	(44.5, 57.3)
NHANES	52.1	(45.3, 58.8)	25.6	(18.5, 32.6)	36.8	(28.8, 44.8)
<i>Marijuana use, past 12 mo</i>						
HRBS	4.4	(2.2, 6.5)	4.5	(1.8, 7.2)	6.9	(2.8, 10.9)
NHANES	32.3	(23.2, 41.5)^	30.4	(21.4, 39.5)^	22.8	(14.4, 31.2)^
<i>Cocaine/heroin/meth use, past 12 mo</i>						
HRBS	2.7	(1.7, 3.8)	0.0	(0, 0.1)	3.2	(1.0, 5.4)
NHANES	4.8	(0.7, 8.9)	3.8	(0.4, 7.2)^	4.3	(1.1, 7.4)
Sexual Risk Behavior						
<i>2+ sex partners, past 12 mo</i>						
HRBS	38.9	(35.6, 42.1)	35.9	(30.3, 41.4)	42.5	(34.8, 50.3)^
NHANES	28.6	(21.4, 35.7)	27.7	(21.4, 34.1)	25.8	(18.0, 33.6)
<i>Any new sexual partners, past 12 mo</i>						
HRBS	50.6	(46.7, 54.5)^	44.8	(37.5, 52.0)^	54.1	(48.1, 60.1)^
NHANES (2009-10 only)	33.3	(24.1, 42.6)	22.2	(11.8, 32.7)	33.6	(23.2, 44.0)
Ages 26-34 years (HRBS n=2,074; NHANES n=404)						
	White		Black		Hispanic	
	%	95% CI	%	95% CI	%	95% CI
Alcohol/Drug Use						
<i>Binge drinking, past 12 mo</i>						
HRBS	44.0	(39.8, 48.1)	29.4	(24.4, 34.4)^	45.8	(35.1, 56.5)

NHANES	43.6	(36.7, 50.5)	17.1	(11.0, 23.2)	28.3	(20.0, 36.6)
<i>Marijuana use, past 12 mo</i>						
HRBS	1.1	(0.4, 1.7)	2.4	(0.3, 4.4)	4.0	(0.1, 7.9)
NHANES	19.0	(13.6, 24.5)^	17.1	(11.0, 23.3)^	9.5	(4.5, 14.6)
<i>Cocaine/heroin/meth use, past 12 mo</i>						
HRBS	0.8	(0, 1.5)	0.0	(0, 0.1)	3.0	(0, 6.9)
NHANES	2.0	(0, 4.3)	1.0	(0, 3.2)	1.5	(0, 3.5)
Sexual Risk Behavior						
<i>2+ sex partners, past 12 mo</i>						
HRBS	24.6	(20.0, 29.2)	22.2	(15.6, 28.8)	24.9	(12.7, 37.0)
NHANES	21.4	(15.1, 27.6)	20.5	(14.5, 26.6)	18.6	(13.2, 24.0)
<i>Any new sexual partners, past 12 mo</i>						
HRBS	32.6	(28.6, 36.5)	30.5	(23.8, 37.2)^	28.6	(19.8, 37.5)
NHANES	16.4	(10.1, 22.7)	5.3	(0, 12.1)	16.7	(9.4, 23.9)
<i>Ages 35-49 years (HRBS n=1,367; NHANES n=759)</i>						
	White		Black		Hispanic	
	%	95% CI	%	95% CI	%	95% CI
Alcohol/Drug Use						
<i>Binge drinking, past 12 mo</i>						
HRBS	31.7	(25.4, 37.9)	29.9	(22.8, 36.9)^	29.3	(16.7, 41.9)
NHANES	32.8	(27.2, 38.4)	6.3	(0.8, 11.9)	17.5	(11.0, 24.0)
<i>Marijuana use, past 12 mo</i>						
HRBS	0.5	(0, 1.1)	0.2	(0, 0.5)	3.6	(0, 9.1)
NHANES	16.4	(12.8, 20.0)^	14.5	(9.0, 19.9)^	6.9	(3.4, 10.3)
<i>Cocaine/heroin/meth use, past 12 mo</i>						
HRBS	0.1	(0, 0.4)	0.0	--	3.4	(0, 8.8)
NHANES	2.7	(1.1, 4.3)^	1.7	(0, 3.9)	2.2	(0, 4.4)

Sexual Risk Behavior

2+ sex partners, past 12 mo

HRBS	12.2	(7.6, 16.9)	14.9	(10.9, 18.9)	12.9	(2.6, 23.3)
NHANES	16.8	(11.7, 21.9)	16.0	(11.0, 21.0)	14.0	(9.0, 19.1)

Any new sexual partners, past 12 mo

HRBS	20.0	(14.4, 25.5)	26.9	(22.6, 31.3)^	19.9	(7.2, 32.5)
NHANES	12.8	(7.0, 18.5)	1.6	(0, 7.2)	13.0	(4.9, 21.2)

n's are unweighted; percentages are weighted

^95% confidence intervals for the prevalence do not overlap

Note: NHANES prevalence estimates are standardized to HRBS with respect to education and marital status

¹Includes sexually active women aged 20-49 years; excluding military veterans, women who were HIV positive, unemployed women, and women with a military-disqualifying health condition including asthma or bronchitis, arthritis, congestive heart failure, emphysema, or a cancer/malignancy

²Includes sexually active women aged 20-49 years

Table 4.4. Multivariable logistic regression of factors associated with an STI¹, by data set

<i>Characteristic</i>	2007-2010 NHANES (n=1,347)		2008 HRBS (n=5,706)	
	<u>AOR</u>	<u>95% CI</u>	<u>AOR</u>	<u>95% CI</u>
<i>Age, years</i>				
20-25	1.00	Reference	1.00	Reference
26-34	2.14	1.22, 3.77*	0.76	0.53, 1.09
35-49	3.58	2.11, 6.09*	0.44	0.27, 0.73*
<i>Race/ethnicity</i>				
White	1.00	Reference	1.00	Reference
African American	5.07	3.61, 7.12*	2.27	1.38, 3.72*
Hispanic	1.72	1.15, 2.57*	1.08	0.59, 1.98
Other	1.46	0.82, 2.61	0.97	0.57, 1.63
<i>Education</i>				
High school or less	1.00	Reference	1.00	Reference
Some college	1.13	0.69, 1.85	0.73	0.51, 1.06
College or more	0.63	0.40, 1.02	0.93	0.61, 1.40
<i>Married</i>				
Yes	0.52	0.39, 0.70*	0.77	0.54, 1.10
No	1.00	Reference	1.00	Reference
<i>Binge drinking²</i>				
Yes	1.13	0.72, 1.78	1.52	1.24, 1.86*
No	1.00	Reference	1.00	Reference
<i>No. of sex partners, past 12 mo</i>				
5+	1.92	0.77, 4.82	5.98	3.37, 10.62*
2-4	1.11	0.69, 1.79	2.82	1.95, 4.08*
1	1.00	Reference	1.00	Reference
<i>Condom use²</i>				
Yes	0.72	0.54, 0.97*	0.86	0.50, 1.47
No	1.00	Reference	1.00	Reference
<i>Marijuana use, past 12 mo</i>				
Yes	1.42	1.04, 1.96*	0.91	0.52, 1.61
No	1.00	Reference	1.00	Reference
<i>Cocaine, heroin, or methamphetamine use, past 12 mo</i>				
Yes	0.99	0.51, 1.95	2.16	1.06, 4.38*
No	1.00	Reference	1.00	Reference

AOR=Adjusted Odds Ratio

*p<0.05; P-values derived by a single multiple logistic regression model within each data set

¹In NHANES, STI is defined as self-report or laboratory diagnosis of chlamydia or gonorrhea in the past 12 months, or genital herpes ever. In HRBS, STI is defined as the self-report of any STI within the past 12 months

²See Table 4.1 for information about differences between variable coding in NHANES and HRBS

Figure 4.1. Prevalence of past year binge drinking among sexually active military and civilian women, by age and race/ethnicity

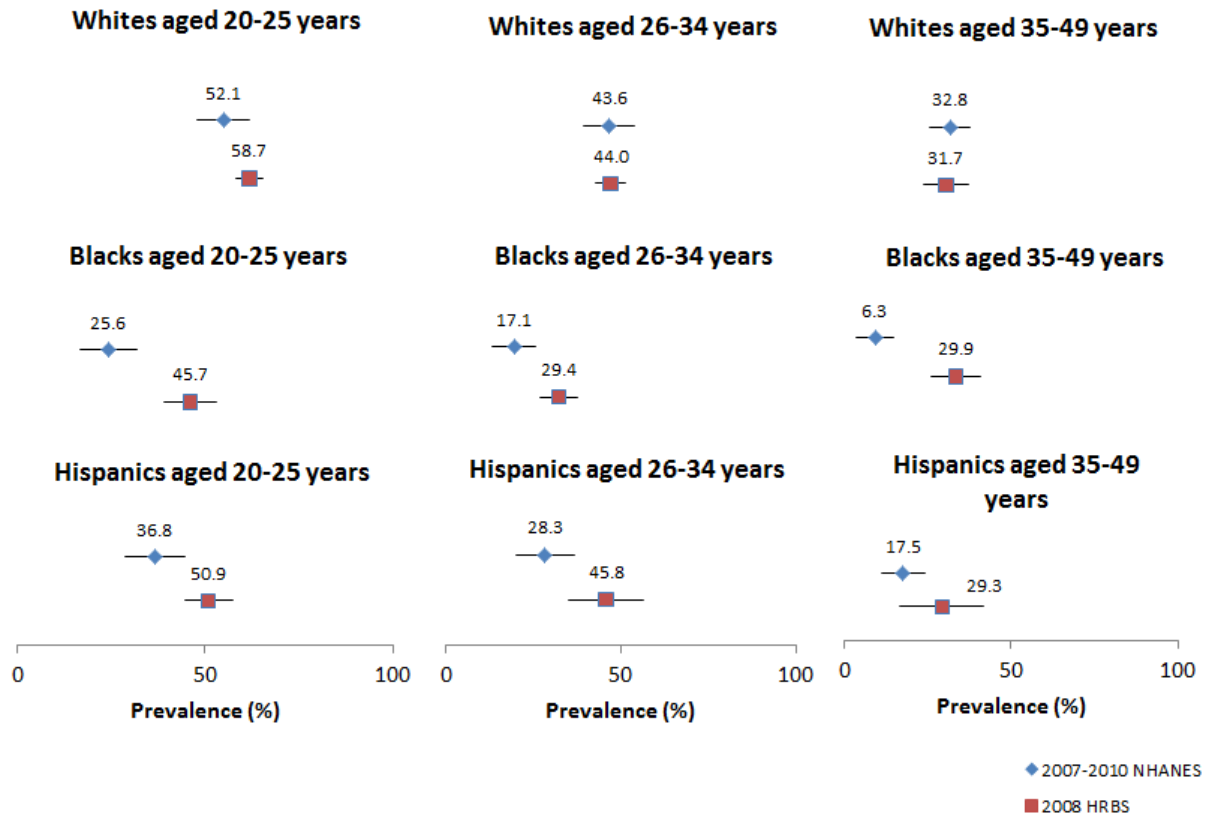
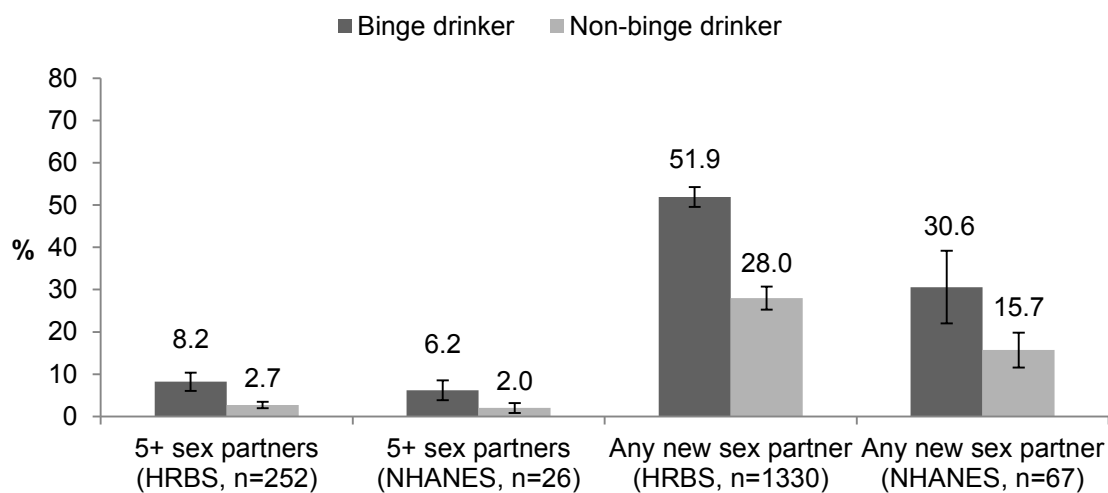


Figure 4.2. Self-reported prevalence of new and multiple sexual partners in the past 12 months, among binge drinkers and non-binge drinkers



Brackets indicate 95% confidence intervals for the percentage

Note: NHANES prevalence estimates are standardized to the military population with respect to age, race/ethnicity, education, and marital status

4.6 References

1. *2010 Demographics Profile of the Military Community*, Department of Defense.
2. National Center for Veterans Analysis and Statistics, America's Women Veterans: Military Service History and VA Benefit Utilization Statistics. Department of Veterans Affairs. Washington DC (2011). Available at: http://www.va.gov/VETDATA/docs/SpecialReports/Final_Womens_Report_3_2_12_v_7.pdf.
3. Goyal, V., K.M. Mattocks, and A.G. Sadler, *High-risk behavior and sexually transmitted infections among U.S. active duty servicewomen and veterans*. J Womens Health (Larchmt), 2012. **21**(11): p. 1155-69.
4. O'Rourke, K., A. Richman, M. Roddy, et al., *Does pregnancy/paternity intention predict contraception use? A study among US soldiers who have completed initial entry training*. J Fam Plann Reprod Health Care, 2008. **34**(3): p. 165-8.
5. Hwang, L.Y., M.A. Shafer, L.M. Pollack, et al., *Sexual behaviors after universal screening of sexually transmitted infections in healthy young women*. Obstet Gynecol, 2007. **109**(1): p. 105-13.
6. Lehavot, K., J.G. Katon, E.C. Williams, et al., *Sexual Behaviors and Sexually Transmitted Infections in a Nationally Representative Sample of Women Veterans and Nonveterans*. J Womens Health (Larchmt), 2013.
7. Eggleston, E., S.M. Rogers, C.F. Turner, et al., *Chlamydia trachomatis Infection Among 15-to 35-Year-Olds in Baltimore, MD*. Sexually Transmitted Diseases, 2011. **38**(8): p. 743-749.
8. Navarro, C., A. Jolly, N. Rama, et al., *Risk factors for genital chlamydial infection*. Canadian Journal of Infectious Diseases, 2002. **13**(3): p. 195-207.
9. Datta, S.D., E. Torrone, D. Kruszon-Moran, et al., *Chlamydia trachomatis Trends in the United States Among Persons 14 to 39 Years of Age, 1999-2008*. Sexually Transmitted Diseases, 2012. **39**(2): p. 92-96.
10. Gaydos, C.A., M.R. Howell, B. Pare, et al., *Chlamydia trachomatis infections in female military recruits*. N Engl J Med, 1998. **339**(11): p. 739-44.

11. Thomas, A.G., S.K. Brodine, R. Shaffer, et al., *Chlamydial infection and unplanned pregnancy in women with ready access to health care*. *Obstet Gynecol*, 2001. **98**(6): p. 1117-23.
12. Brodine, S.K., M.A. Shafer, R.A. Shaffer, et al., *Asymptomatic sexually transmitted disease prevalence in four military populations: Application of DNA amplification assays for Chlamydia and gonorrhea screening*. *Journal of Infectious Diseases*, 1998. **178**(4): p. 1202-1204.
13. Miller, W.C., C.A. Ford, M. Morris, et al., *Prevalence of chlamydial and gonococcal infections among young adults in the United States*. *JAMA*, 2004. **291**(18): p. 2229-36.
14. Garges, E., K. Holmes, and M. MacDonald. Focus on the Treatment of STDs in Military Populations - 2010 STD Treatment Guidelines Webinar. 2013. Available at: <http://www.cdc.gov/std/treatment/2010/Military-Webinar-slides.pdf>. Accessed April 7, 2013.
15. A Guide to Female Soldier Readiness, USACHPPM Technical Guide 281. June 2010. Available at: <http://phc.amedd.army.mil/PHC%20Resource%20Library/TG281finalJuly2010.pdf>. Accessed April 7, 2013.
16. Centers for Disease Control and Prevention. National Center for Health Statistics. Continuous NHANES Sample Design. [webpage]. May 7, 2013. Available at: <http://www.cdc.gov/nchs/tutorials/nhanes/surveydesign/SampleDesign/intro.htm>. Accessed October 9, 2013.
17. RTI International. (2009). *2008 Department of Defense Survey of Health Related Behaviors Among Active Duty Military Personnel*. Available at www.tricare.mil/tma/2008HealthBehaviors.pdf.
18. Witt, M.B., K.L.R. Olmsted, K. Spagnola, et al., 2008 Department of Defense Survey of Health Related Behaviors Among Active Duty Military Personnel: Codebook for the Public Use File. (2009).
19. Cumming, G., *Inference by eye: reading the overlap of independent confidence intervals*. *Stat Med*, 2009. **28**(2): p. 205-20.

20. Naimi, T.S., R.D. Brewer, A. Mokdad, et al., *Binge drinking among US adults*. Jama-Journal of the American Medical Association, 2003. **289**(1): p. 70-75.
21. Santelli, J.S., N.D. Brener, R. Lowry, et al., *Multiple sexual partners among US adolescents and young adults*. Fam Plann Perspect, 1998. **30**(6): p. 271-275.
22. Stahre, M.A., R.D. Brewer, V.P. Fonseca, et al., *Binge Drinking Among US Active-Duty Military Personnel*. American Journal of Preventive Medicine, 2009. **36**(3): p. 208-217.
23. Malone, P.S., T.F. Northrup, K.E. Masyn, et al., *Initiation and persistence of alcohol use in United States Black, Hispanic, and White male and female youth*. Addict Behav, 2012. **37**(3): p. 299-305.
24. Oswalt, S.B. and T.J. Wyatt, *Sexual Health Behaviors and Sexual Orientation in a U.S. National Sample of College Students*. Arch Sex Behav, 2013.
25. Hutton, H.E., M.E. McCaul, P.B. Santora, et al., *The relationship between recent alcohol use and sexual behaviors: gender differences among sexually transmitted disease clinic patients*. Alcohol Clin Exp Res, 2008. **32**(11): p. 2008-15.
26. Adimora, A.A., V.J. Schoenbach, E.M. Taylor, et al., *Concurrent partnerships, nonmonogamous partners, and substance use among women in the United States*. Am J Public Health, 2011. **101**(1): p. 128-36.
27. National Priorities Project. Military Recruitment 2010. [website]. June 30, 2011. Available at: <http://nationalpriorities.org/analysis/2011/military-recruitment-2010/>. Accessed May 11, 2013.
28. Valencia, L.S. and B.A. Cromer, *Sexual activity and other high-risk behaviors in adolescents with chronic illness: a review*. J Pediatr Adolesc Gynecol, 2000. **13**(2): p. 53-64.
29. Jacoby, C.H., *General Order Number 1, The Uniform Code of Military Justice and United States Central Command*, Editor 2009: Headquarters Multi-National Corps- Iraq.

Chapter 5. Concluding Remarks

The proportion of women serving in the U.S. military and fulfilling combat roles is growing rapidly,^{1, 2} and because of this there will likely soon be even greater demand for active duty service women's health care services.³ The military environment inherently contains a certain amount of risk, such as exposure to warfare or combat, which cannot be removed by public health intervention. However, there are opportunities for public health interventions to modify sexual risk behaviors and to limit exposure to other stressful encounters such as unwanted sexual contact. The purpose of this dissertation was to expand the current understanding of sexual risk behaviors among women in the U.S. military in order to facilitate the development of effective interventions to promote sexual health.

Chapter 2 aimed to characterize differences in STI risk and investigate patterns in sexual risk behaviors by gender, and to explore gender-specific behavioral characteristics associated with report of a recent STI and report of recent multiple sexual partners among military personnel. The results indicate that prevalence of sexual risk behaviors do vary significantly by gender, and that mental health indicators can be associated with certain types of sexual risk behaviors. Several factors associated with the report of recent multiple sexual partners were also identified, including some that were gender-specific. These findings support the development of gender-specific STI intervention strategies among military personnel as well as the adoption of military policies to reduce unique gender-related stresses among women in the military.

Chapter 3 aimed to examine risk factors associated with report of unwanted sexual contact among active duty service women. This study demonstrated that

unwanted sexual contact was associated with screening positive for adverse mental health indicators, as well as binge drinking and certain types of prescription drug misuse. An interesting finding was that the presence of a spouse in the military modified the association between psychological distress and unwanted sexual contact, suggesting that women with a spouse present during active duty might have better coping mechanisms for adverse mental health conditions and may also be less vulnerable to unwanted sexual contact. Because the prevalence of unwanted sexual contact was relatively high in our sample of active duty military women, screening for unwanted sexual contact and its associated health risks, such as mental health, should be a priority.

In order to compare the prevalence of sexual risk behavior and risk for STIs between women in the military and women in the general population, Chapter 4 aimed to adjust for demographic factors among women sampled in the 2007-2010 NHANES (civilians) and to conduct a comparative analysis with women in the HRBS (military). The results showed that after stratifying by age and race/ethnicity and controlling for potential confounders, younger and particularly Black and Hispanic military women had almost double the prevalence of binge drinking as compared with civilians. In addition, service women aged 20-25 years reported a higher proportion of sexual partners and new recent sexual partners as compared with civilian women. These results indicated that certain aspects of the military environment, such as easy access to alcohol and a high proportion of young, unmarried adults living in close proximity to one another can facilitate risk behaviors such as binge drinking and high turnover of sexual partners. Because prevalence of risk behavior varied among age and racial/ethnic group, STI

intervention strategies should be designed with these demographic differences taken into consideration.

Although there are several limitations to consider, the studies in this dissertation make the best possible use of existing public-use data for active duty military women. One major strength is the large sample size of active duty personnel, who were sampled at random across several U.S. military installations. In addition, the extensive amount of behavioral and health information collected from women in the NHANES allow for making comparisons to a “gold standard” reference population. Certain subgroups of women in the general population, i.e., younger women attending college, are also exposed to behaviors that are highly prevalent in the military, such as binge drinking.⁴ These dissertation findings may also be relevant to these subgroups of women, as well as to both the Military Health System and U.S. public health.

5.1 References

1. Patten, E. and K. Parker *Women in the U.S. Military: Growing Share, Distinctive Profile*. Pew Research Social & Demographic Trends, 2011. Available at: <http://www.pewsocialtrends.org/2011/12/22/women-in-the-u-s-military-growing-share-distinctive-profile/2/#a-snapshot-of-active-duty-women>.
2. Women Veterans: Past, Present and Future. *US Department of Veterans Affairs: Office of Policy and Planning*. CreateSpace 2007. March 1, 2012. Available at: www1.va.gov/womenvet/docs/womenvet_history.pdf.
3. *Health Care for Women in the Military and Women Veterans*. Obstetrics and Gynecology, 2012. **120**(6): p. 1538-1542.
4. Results from the 2012 National Survey on Drug Use and Health: Summary of National Findings. *Figure 3.4 Binge Alcohol Use among Adults Aged 18 to 22, by College Enrollment: 2002-2012*. Available at: <http://www.samhsa.gov/data/NSDUH/2012SummNatFindDetTables/NationalFindings/NSDUHresults2012.htm>. Accessed March 1, 2014.