

Evaluations of Sexual Assault Prevention Programs in Military Settings: A Synthesis of the Research Literature

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ABSTRACT The prevention of sexual assault (SA) in the U.S. military is a significant priority. This study applied the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to a literature search that identified research evaluating SA prevention programs conducted within military settings. Only six studies published between 2005 and 2016 met criteria for inclusion in the review. Studies demonstrated high heterogeneity in the: (1) conceptual framework of the prevention approach; (2) target population and timing of administration; (3) study recruitment methods; (4) methodological design; (5) method of delivery, program dosage and theory of change; and (6) outcome administration and efficacy. Scientific rigor according to the Oxford Center for Evidence-based Medicine was also variable. Several gaps in the research base were identified. Specifically, research evaluating SA prevention programs have only been conducted among U.S. Army and U.S. Navy samples. Most studies did not examine whether program participation was associated with reductions in rates of sexual violence. Studies also lacked utilization of a long-term follow-up period. Additionally, studies did not reflect the types of SA prevention programs currently being implemented in military settings. Taken together, further research is needed to enhance the evidence base for SA prevention in the military, and to evaluate the effectiveness of the approaches currently being conducted with service members.

INTRODUCTION

Sexual assault (SA) in the U.S. military is a significant public health concern¹⁻³ with wide ranging consequences.⁴⁻⁷ The prevalence rate of SA during military service range from 4 to 7% among women and 1 to 2% among men,^{8,9} exceeding the prevalence rate among same-age civilian populations.^{9,10} These data are concerning, as the number of reported incidents of SA far underrepresent the number of assaults that actually occur.¹¹

Despite core values emphasizing mutual respect and protection,¹² military environments foster unique pressures that facilitate sexual violence.^{8,13-15} Prior to January 2016, female service members were excluded from full participation in military service, including combat roles that often led to promotion

to higher ranking positions.^{4,9,13,14} Although there is little research available on the impact of historical discrimination against women in the military,¹⁶ negative attitudes toward women are a salient risk factor for gender-based violence.¹⁷ For example, pressure to adhere to the cultural expectations of the military are especially strong in the context of military units due to an emphasis on cohesion.¹⁸ Additionally, hypermasculinity – conceptualized as rigid social norms that encourage internalization of emotion and exhibition strength and virility – is inherent to a service member's ability to perform within many military contexts.^{4,14} Hypermasculine attitudes are a strong correlate of sexual aggression in civilian populations,¹⁹ and it is likely that hypermasculinity may facilitate sexual aggression in the military.⁹

In 2005, the Department of Defense (DoD) established the Sexual Assault Prevention and Response Office (SAPRO) as the centralized helm of all SA efforts.²⁰ The SAPRO's focus is on prevention, surveillance, and the reporting of SA. Prior to the creation of SAPRO, each branch of the military implemented its own SA prevention programming. Currently, all branches (with the exception of the Coast Guard that falls under the jurisdiction of the Department of Homeland Security) are overseen by SAPRO and implement their own SA prevention programs in accordance with DoD guidelines.

Despite their centralized supervision by SAPRO and attempts to draw upon evidence-based civilian SA prevention programs,^{1,9,21} SA prevention programs vary across branches of the military.¹³ Currently, there is a lack of formal evaluations as to whether the existing SA prevention program efforts being facilitated in the Navy, Army, Marines, and Air Force have elicited attitude or behavior change or reduced

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rates of SA among service members over any duration of time.²² Additionally, the DoD collects data on prevalence rates on a yearly basis that could be seen as a marker of overall trends of reporting violence, however to evaluate the efficacy of programs, rigorous research is needed.

Given the scope of sexual violence, and the heterogeneity of SA prevention efforts in the military, civilian researchers^{4,9,14,23} and government leaders^{20,21,24} alike have called for more rigorous and systematic evaluation of the efficacy of military SA prevention programs.^{9,14,23,25} To inform this vital work, the present study provides a systematic review of the efficacy of SA prevention programs evaluated among military populations.

METHODS

In accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines²⁶ – including use of an a priori designed study protocol that guided our literature search, study selection, and data synthesis – a systematic search of the literature was conducted to locate studies evaluating the efficacy of SA prevention programs in the military. Searches were performed using the electronic databases PubMed, Medline, PsycINFO, ERIC, CINAHL, Science Direct, Cochrane Library of Systematic Reviews, Military & Government Collection, Criminal Justice Abstracts, and the website GreyLit.org.

Databases were searched using Boolean combination of keywords. Keyword combinations used were variations of (1) “sexual assault” (assault, SA perpetration, sexual abuse, sexual aggression, sexual violence, victim); (2) “study type” (intervention, prevention, brief motivational interviewing, brief intervention, review, program, evaluation, trial, training, workshop); and (3) “military” (military, soldiers, army, air force, navy, marines, and active duty). Given that many SAs involve alcohol use by the victim and or perpetrator,²⁷ the search term “alcohol”²⁸ (alcohol use, alcohol misuse, alcohol abuse, drinking, substance use, substance misuse, substance abuse) as it relates to SA was also used. Manual searches of technical reports and reference sections of were also performed.

Inclusion Criteria

To ensure that the review reflected recent work, the literature review sought to identify all original research studies evaluating the efficacy of SA prevention programs for the military published between January 2005 and March 2016. Research studies that utilized randomized and non-randomized designs as well as observational studies were eligible for inclusion in the review. Case reports, case series or studies where the sample size was smaller than 20 participants were excluded. The search was further restricted to studies published in English.

Data Abstraction and Synthesis

The initial literature search yielded 32,697 results. After applying filters and removing duplicates, 6,810 articles were

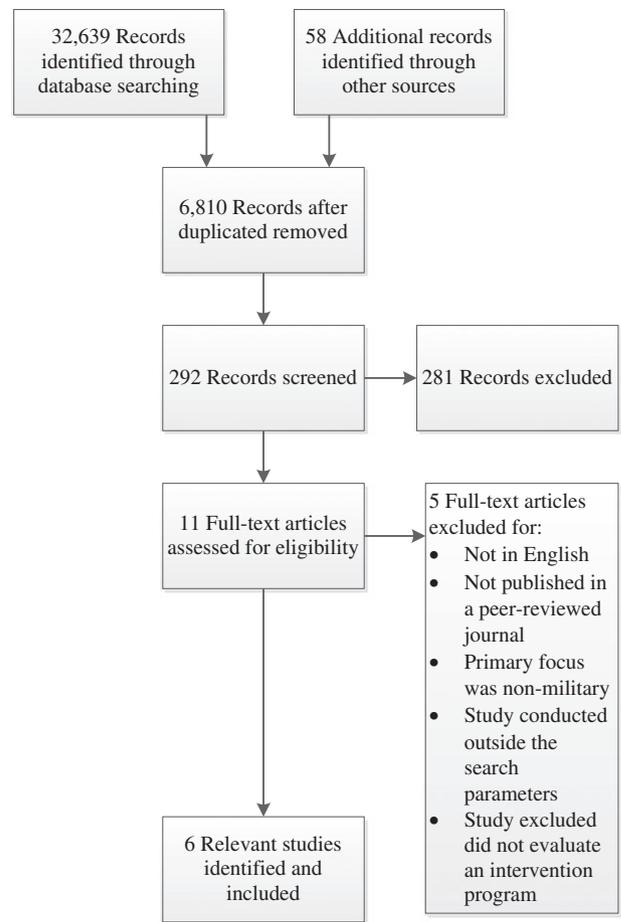


FIGURE 1. Flowchart documenting the article selection process.

selected for further screening. Titles and abstracts of these articles were screened for potential relevance and eligibility. A total of 292 abstracts were considered relevant. Each abstract was independently reviewed to examine whether the publication met study inclusion and exclusion criteria. From these articles, 281 were determined to be ineligible. Eleven articles were identified for full-text review and after further examination, five of these studies were excluded. Inter-rater reliability between them for yes/no inclusion decision was 0.90, indicating strong agreement. The final six articles were then independently reviewed by members of the research team (Fig. 1).

The research team comprised of three senior researchers and three research assistants, who worked together to screen, abstract, and analyze articles. To ensure reliability in the abstraction process, the research assistants independently extracted data from the final articles and met regularly with senior researchers to discuss emerging findings and results. Information was collected on the study’s sample, conceptual framework, methods, outcome measures, results, and strengths and limitations. Discrepancies in the selection of articles for review were discussed with senior researchers until consensus was reached.

TABLE I. Oxford Center for Evidence-Based Medicine Rating Scale²⁹

Level	System for Assessing the Body of Evidence
1	Systematic review of randomized trials or <i>n</i> -of-1 trial
2	Cross-sectional or randomized control trial or secondary analyses
3	Follow-up or pilot test or post-test
4	Case series
5	Opinion without explicit critical appraisal

Due to the heterogeneity among the six studies examined, a comprehensive summary and critique of the studies was prepared to reflect the following domains: (1) conceptual framework of the prevention approach; (2) target population and timing of administration; (3) study recruitment methods; (4) methodological design and scientific rigor; (5) method of delivery, program dosage, and theory of change; and (6) outcome administration and efficacy. Scientific rigor was assessed with the 2011 levels of evidence issued by the Oxford Center for Evidence-based Medicine Oxford Guidelines (Table I).²⁹ These guidelines characterize the rigor of their research design, ranging from weakest (Level 5) methodological design (e.g., cross-sectional or pilot) to strongest (Level 1) methodological design (e.g., systematic review or randomized control trial). Table II presents a summary of each study.

RESULTS

Overview of the SA Prevention Programs

Six studies described five distinct SA prevention programs, including: (1) bringing in the Bystander (BITB); (2) the Know Your Power social marketing campaign; (3) the Men's Program; (4) the Navy Sexual Assault Intervention Training Program (SAIT); and (5) the Sexual Assault Victim Intervention (SAVI).^{30–35} Three of these programs – BITB, The Men's Program, and Know Your Power – are SA prevention approaches previously implemented and evaluated among college students.^{30–33,36} Two of the programs – the Navy SAIT, and Navy SAVI – are SA prevention approaches specifically developed for the military (Table II).^{34,35}

The methodology and outcomes of the evaluation of The Men's Program and Know Your Power in college and military are similar. In both college and military samples, the Men's Program was associated with a lower rape myth acceptance and self-reported likelihood of engaging in unwanted sexual behavior with a female partner at the immediately post-program assessment.^{30,37} Outcomes of the Know Your Power Social Marketing Campaign program in college and military samples varied slightly. In the military sample, exposure to the program increased service members feeling that they were responsible for preventing SA. In college students, exposure to the campaign resulted in increased awareness about the responsibility to reduce relationship abuse and stalking, increased willingness to help reduce

violence, and increased self-report of engagement in bystander intervention.^{33,38}

The BITB college and military samples vary in methods and outcome.^{32,36} College students were randomly assigned to the program or a control group; participants reported improvements in attitudes (i.e., bystander efficacy, rape myth acceptance, myths regarding date rape, bystander attitudes, barriers to bystander intervention), knowledge and bystander behavior; which were maintained over 4- and 12-mo follow-ups. However, in the military sample, participants were not randomized to condition. Compared with soldiers who did not complete the program, program completers were more likely to engage in bystander behaviors in the 4½ mo after program participation.^{32,36}

Target Population and Timing of Administration

The population targeted in each program varied. Most participants were unmarried, age 18–26, new recruits, and lived in the barracks. All programs were universal in nature, although evaluations of Navy SAIT program and The Men's Program were administered among single-sex groups.^{30,34}

None of the studies specifically targeted service members based on their length of time in service. Although two studies conducted by Rau and colleagues described the length of time in service among program participants, analyses did not formally examine whether program effects varied as a function of this variable.^{34,35} Furthermore, this review found no SA prevention programs in the research literature that targeted different points in time during military service (i.e., basic training, post-deployment).

Study Recruitment Methods

Most studies worked in conjunction with military command to “task”, “identify”, or “refer” participants to the study.^{30,32–35} For example, the evaluation of the Know Your Power social marketing campaign engaged Commanders to identify potential participants between the ages of 18 and 26, living in the barracks, and present on the installation. Soldiers identified by Commanders as meeting these criteria were asked to complete an online survey evaluating their exposure to the marketing campaign.³³ The Navy SAIT program also worked with Commanders to refer participants to the study. Utilizing a Solomon Four Group Design, participants were then randomly assigned to a condition (Program/Control) and assessment condition (No Pretesting/Pretesting).^{34,35} In recruiting participants to engage in The Men's Program, Foubert and Masin also collaborated with commanders to identify potential research participants; however the specific methods of recruitment was not reported. In evaluating the Navy SAVI program, Kelley *et al*.³¹ used a purposive sampling approach to target program users, recruiting individuals who had utilized the program or perceived themselves to have a good understanding of the program. This research team traveled to a Navy-wide meeting of SAVI program managers, engaged Base-level program directions through

TABLE II. Studies Evaluating Sexual Assault Prevention Programs in Military Populations

Source	Branch	Sample	N	Method(s) and Survey Design	Outcome Measures	Oxford Ranking
Foubert and Masin ³⁰	Army	Age ≈ 25 yr Program (237) Control (244) Gender: Men	481	RCT(pre-test/post-test)	Bystander Willingness to Help Scale ⁴⁶ Bystander Efficacy Scale ⁴⁶ Likelihood of Raping Scale ⁴⁷ Illinois Rape Myth Acceptance Scale ⁴⁸	2
Selected Results: In comparison to men in the control group, men who participated in the Men's Program reported increased willingness and greater ability to intervene in a SA situation, decreased acceptance and perceived likelihood of perpetrating sexual aggression at post-test. Participants in the comparison group demonstrated a small decrease in rape myth acceptance at post-test.						
Kelley et al ³¹	86% Navy 4% Navy spouse 2% Active duty other 8% Other	Age: NR Gender: Mixed	503	Cross-Sectional (Retrospective Report)	Developed for the study: 1. Advocacy/training program contributes to my overall quality of life 2. Advocacy/training program contributes to my overall readiness 3. Advocacy/training program positively affects my retention plans Reason for Being Survey	4
Selected results: The SAVI program had a positive effect on self-reported quality of life and readiness for duty. Participants perceived the SAVI program to facilitate coping with sexual trauma, particularly among those who utilized the advocacy group. The SAVI program did not have an impact on the respondent's retention plans. Participants also rated the quality of advocacy and the prevention components of the SAVI program to be high.						
Potter and Moynihan ³²	Army	Age: NR BITB (131) Control (337) Gender: Mixed	394	Pilot, Quasi-experimental (post-test only)	Bystander Behavior Scale ⁴⁶ Action Stages of Change Subscale ⁴⁹	3
Selected results: Compared with individuals who did not engage in BITB, at a 4.5 mo follow-up BITB participants engaged in a greater number of bystander behaviors to aid a friend, acquaintance, or stranger compared with soldiers who did not participate, regardless of prior training, were more likely to engage in some form of bystander intervention, and reported higher levels of readiness to engage in bystander intervention as indicated by the Action Stages of Change Subscale.						
Potter and Stapleton ³³	Army	Age: 26.4 yr Gender: Mixed Male (83%) AD (91%)	155	Quasi-experiment (post-test only)	Stages of Change III ⁵⁰ Bystander Efficacy Scale ⁴⁶ Bystander Behavior Scale ⁴⁶ Social Self-Identification Measure ⁵¹	3
Selected results: Soldiers who identified with the people and situations depicted in the "Know Your Power" poster reported acting as a prosocial bystander at a higher rate and were more likely to report that they had a role to play in the prevention of SA than those who were not exposed to, or did not identify with, the images. Soldiers who reported exposure to the posters were also more likely to report acting as an active bystander (38%) compared with soldiers not exposed to the posters (12%).						
Rau et al ³⁴	Navy	Age: 20 yr Gender: Male	1,505	RCT Solomon 4-group Design (pre-/post-test)	Rape Myth Acceptance Scale ⁵² Rape Myth Acceptance Scale ⁵³ Rape Empathy Scale ⁵⁴ Developed for the study: 1. Rape Knowledge Scale	2
Selected results: Compared with control, men who participated in SAIT reported greater rape knowledge, less acceptance of rape myths, and greater empathy for victims at post-test.						
Rau et al ³⁵	Navy	Age: 19 yr Gender: Female	550	RCT Solomon 4-group Design (pre-/post-test)	Rape Myth Acceptance Scale ⁵³ Rape Myth Acceptance Scale ⁵⁴ Rape Empathy Scale ⁵⁵ Developed for the study: 1. Rape Knowledge Scale	2
Selected results: Women who participated in SAIT reported greater rape knowledge and empathy for victims at post-test compared with women in the comparison group. The effect was stronger for women who completed pretest than for those randomly assigned to the no pre-test group.						

RCT, randomized control trial; NR, not reported; BITB, Bringing in the Bystander

email, and worked with SAVI program managers to design and administer the survey. A description of the recruitment strategies utilized in evaluating BITB among 394 U.S. Army Europe personnel (USAERUR) was not delineated.³²

Methodological Design and Scientific Rigor

A team of three independent raters utilized the levels of evidence provided by the Oxford Guidelines to rank the rigor of the research design.²⁹ Raters demonstrated 100% agreement in rankings. Studies varied in their methodological rigor, with one study rated low (Level 4),³¹ two rated as moderate (Level 3),^{32,33} and three rated as high in rigor (Level 2).^{30,34,35} Three studies included random assignment to condition and pre/post testing rated as high in rigor included Rau and colleagues' evaluations of Navy SAIT among men and women, as well as Foubert and Masin's evaluation of The Men's Program.^{30,34,35} Studies rated in moderate in rigor included Potter and Stapleton's evaluation of BITB as well as Potter and Moynihan's evaluation of the Know Your Power social marketing campaign, which both utilized quasi-experimental design that included post-test only.^{32,33} It should be noted however, that despite the lack of pre-testing and random assignment in Potter and Stapleton's evaluation of BITB, this study was the only evaluation to include a longitudinal follow-up with study participants completing study assessments approximately 4½ months after program administration.³³ The evaluation of Navy SAVI conducted by Kelley was rated as low in methodological rigor due to the lack of a comparison group, lack of random assignment to condition and utilization of a retrospective survey report.³¹ It should also be noted that the Oxford Guidelines do not account for the comprehensiveness of the survey battery, and all of the studies included in the present review assessed a relatively small number of program outcomes, and several studies implemented survey measures without documented reliability or validity.

Method of Delivery, Program Dosage and Theory of Change

All of the studies administered an in-person group training program with the exception of Potter and Stapleton's Know Your Power social marketing campaign.³³ The Know Your Power social marketing campaign was administered over 6 wk, with a series of four images depicted across hallways and common spaces of the barracks and via table-tents in the dining facilities. The program was monitored for fidelity and any materials were replaced if damaged or removed. Potter and Moynihan's evaluation of BITB was the only study to delineate the length of the in-session program, which was four hours in duration.³² Although facilitators received extensive training in the BITB program, information regarding monitoring the fidelity of program administration is lacking. In fact, all of the evaluations of in-person SA prevention programs lacked formal assessment of the extent to which facilitators demonstrated adherence and competency in program administration. With the

exception of BITB, the extent to which programs followed an explicit program manual was also unclear.

Programs commonly focused on bystander intervention techniques, including skills-training in bystander intervention (BITB, The Men's Program), suggestions for intervening when witnessing risk for sexual violence (Navy SAIT for men), and modeling of intervention skills via posters (Know Your Power).^{30,32-34} The Navy SAIT and Navy SAVI programs include information specific to assisting a victim of sexual violence and the Men's Program also includes a specific focus on increasing empathy for victims.^{34,35}

Program content also varied in targeting recipients as potential victims, perpetrators, or bystanders. The Men's Program was specifically designed for administration among male Service members and focuses on men's likelihood to perpetrate sexual aggression as well as their role as bystanders to perpetuate behaviors that demean women or perpetuate a culture that condones violence against women.³⁰ The content of the Navy SAIT program was tailored to address men as potential perpetrators of SA and women as potential victims.³⁴ Both the Know Your Power social marketing campaign and BITB address men and women equally as community members who have a role to play in addressing the norms that facilitate and condone sexual violence against fellow Service members.^{32,33} Kelley's evaluation did not specify whether the content of the SAVI in-person training program was specific to perpetration risk, victimization risk, or roles for bystanders.³¹

Three of the evaluations described specific behavior change theories. Know Your Power and BITB were informed by components of social psychological theory delineating conditions that facilitating helping behavior, and utilize a stage of change model to facilitate readiness to engage in bystander intervention behavior to address sexual violence.^{32,33} The Men's Program³⁰ drew upon health belief theory focusing on enhancing participants understanding about their own self-conceptions and perceived susceptibility, perceived severity, perceived benefits, and perceived barriers to engaging in healthy behavior. The specific theoretical models of change underlying the in-person training offered within Navy SAIT and Navy SAVI were not delineated.^{31,34,35} However, both Navy SAIT programs focused on increasing knowledge of rape and debunking rape myths, the program for men included content addressing sexual content, signs of sexual coercion, bystander intervention and peer pressure regarding sexual aggression, the program for women also includes content specific to helping survivors of sexual victimization.^{34,35}

Outcome Assessment and Efficacy

None of the studies implemented a longitudinal assessment of rates of sexual violence following program participation. Foubert and Masin³⁰ did document that The Men's Program was associated with a decrease in program participants self-reported likelihood to rape, as assessed by Malamuth's

Likelihood of Raping Scale,³⁹ in comparison to the control group at post-test. It is likely that the lack of a follow-up assessment in all of the studies – with the exception of Potter and Stapleton’s evaluation of BITB – precluded the assessment of the program impact on behavioral outcomes, including the program’s effect on rates of sexual violence.³³

Several studies examined program impact on bystander intervention behavior. Service members who participated in BITB were more likely to report engaging in one of the 117 bystander intervention behaviors over the 4½ month follow-up period, in comparing to those who did not participate in BITB.³² According to Foubert and Masin’s randomized pre- and post-test evaluation of the Men’s Program among 481 male U.S. Army Soldiers in Germany, Soldiers who completed the program reported greater willingness to intervene and greater personal efficacy in bystander intervention compared with the control group at post-test. Furthermore, according to Potter and Stapleton’s evaluation of the Know Your Power social marketing campaign, Soldiers who reported being exposed to the posters over the 6 wk administration period were more likely to report acting as an active bystander in situations where SA was about to occur, was occurring, or had occurred (38%) compared with Soldiers not exposed to the posters (12%).³³ Although Kelley’s examination of the Navy SAVI program did not assess outcomes specific to risk for sexual aggression or sexual victimization, SAVI program participants reported a positive effect of the program on their quality of life, readiness for duty, and retention plans. Participants who utilized advocacy services perceived the SAVI program to be more helpful in coping with sexual trauma compared with those who engaged in SA prevention training services.³¹

Several studies also examined whether program participation influenced knowledge of sexual violence and acceptance of rape myths.^{30,34,35} In Rau *et al*³⁴ evaluation of the Navy SAIT program among men, program participants evidenced greater rape knowledge, were less accepting of rape myths, and had greater empathy with rape victims. Rau *et al*³⁵ evaluation of the SAIT program among women also suggested that at post-test, participants reported greater rape knowledge regarding sexual violence compared with a control group. Despite modest program outcomes, Rau and colleagues two gender-specific evaluations of the Navy SAIT program is notable in that both evaluations include a unique characterization of the study sample at baseline. For example, in the evaluation of SAIT among female Sailors, 52% of participants reported some form of adult SA and 26% reported completed rape at baseline.³⁵ It was also notable that SAIT was equally effective at post-test for men and women with and without a history of coercive sexual behaviors or sexual victimization, respectively.

DISCUSSION

Despite high rates of sexual violence in the military, the present review found only six comprehensive evaluations of

SA prevention programs conducted among military populations. Notably, the programs evaluated in these studies did not reflect the types of SA prevention programs currently being implemented in military settings by SAPRO. Taken together, these findings suggest that more attention is needed to build the evidence base for SA prevention in the military and to evaluate the prevention practices currently being implemented among service members.

Studies varied in methodological rigor, with half of the studies utilizing random assignment condition. Furthermore, although an essential component to understanding the usefulness of a SA prevention approach is whether the program works to promote proximal outcomes and ultimately reduce incidence rates of sexual violence – with the exception of Potter and Moynihan’s evaluation of BITB – studies failed to examine program outcomes over a follow-up periods.³² Lack of a follow-up period precludes the assessment of whether the program influenced rates of sexual violence over time. As a result, it is not known whether the SA programs reviewed produce meaningful or lasting attitude and behavior change in their recipients.

Study findings also revealed interesting differences in the representation of each branch of the military with program evaluations. The studies included in the review reflected only Army and Navy populations; suggesting that formal evaluation of evidence-based SA prevention efforts for various branches of the military is lacking – including the U.S. Air Force, Marines, Coast Guard, and National Guard. Although the study did not meet criteria for inclusion in this review, a systematic review conducted by Gedney, Wood, Lundahl and Butters describes the content of the U.S. Air Force (USAF) Sexual Assault Prevention Programs (SAPPs) across six administration periods.²³ Furthermore, according to Holland and colleagues review of exposure to SA training efforts across branches of the U.S. Military, members of the Air Force document the greatest access to comprehensive SA training as well as had the lowest rates of SA (16%); whereas members of the Navy and Marines document the least access to SA training efforts.¹³ Future studies may explore opportunities to evaluate SA prevention efforts in these settings.

Beyond understanding whether SA programs are efficacious in producing attitude and behavior change, mediation and moderation analyses are essential in understand how a program is working, and for whom it works. It was, therefore, notable that none of the studies included a formal analyses examining the mechanisms of program effects and few of the studies conducted analyses of moderation. For example, Rau *et al*³⁵ documented that the SAIT program among Navy women was equally effective in producing change in knowledge of sexual assault among men and women, regardless of a history of sexual aggression or victimization, respectively. Additionally, it was also notable that although three studies evaluated programs tailored to male or female audiences, it was unclear whether SA prevention efforts

for mixed-sex audiences were equally efficacious among men and women. Theoretical approaches toward addressing risk for sexual violence among men and women vary, and future evaluations should consider whether programs content is equally effective in meeting the needs of male and female service members.⁴⁰

This systematic review revealed several gaps in the content of SA prevention programs evaluated among military populations. Risks for sexual aggression span various levels of the social ecology and include individual, peer-, community-, and environmental factors.⁴¹ Problematically, research of SA prevention in the military lacks attention to several components of a comprehensive prevention package, including: engagement of leadership, developmental sequencing of programming, implementation of program doses likely to support sustained attitude and behavior change, and attention to a range of theoretically-driven and empirically-derived risk factors for sexual violence. For example, there is a well-documented association between alcohol use and sexual aggression,²⁸ and all military branches have implemented alcohol abuse prevention and intervention efforts, including prohibiting underage drinking on base, providing safe rides for inebriated personnel, and training and education classes.^{42–45} Despite the parallel development of alcohol and SA prevention programs, none of the studies included in the present study rigorously addressed alcohol as a risk factor, included evidence-based alcohol intervention, or focused on a heavy drinking sample. Additionally, although military leadership was involved in recruiting participants for the studies, none of the programs included an intervention component specifically focused on engagement of leadership as role models in efforts to prevent violence.

In conclusion, given the prevalence and impact of sexual violence among military populations, it is essential to understand the best practices for preventing SA. The present review documents emerging efforts to evaluate SA prevention programs among military samples. Clearly, more attention is needed to integrate best practices in prevention into existing intervention approaches and utilize more rigorous methodological approaches to program evaluation are necessary to advance the state of the field.²⁵

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PRESENTATIONS

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REFERENCES

1. U.S. Department of Defense: Report to the president of the United States on sexual assault prevention and response. 2014; Available at http://sapr.mil/public/docs/reports/fy14_potus/fy14_dod_report_to_potus_full_report.pdf; accessed July 25, 2016.
2. U.S. Department of Defense. Department of Defense annual report on sexual assault in the military: Fiscal year 2015. 2016; Available at http://www.sapr.mil/public/docs/reports/FY15_Annual/FY15_Annual_Report_on_Sexual_Assault_in_the_Military.pdf; accessed July 25, 2016.
3. Masciotra D: Military violence and scandal: we need a public discussion of the sexual assault epidemic in our armed forces. July 2016. Available at http://www.salon.com/2016/07/16/military_violence_and_scandal_we_need_a_public_discussion_of_the_sexual_assault_epidemic_in_our_armed_forces/; accessed September 23, 2016.
4. Allard CB, Nunnink S, Gregory AM, Klest B, Platt M: Military sexual trauma research: a proposed agenda. *J Trauma Dissociat* 2011; 12(3): 324–45.
5. Bean-Mayberry B, Yano EM, Washington DL, et al: Systematic review of women veterans' health: update on successes and gaps. *Women's Health Issues* 2011; 21(4, Supplement): S84–97.
6. Tiet QQ, Leyva YE, Blau K, Turchik JA, Rosen CS: Military sexual assault, gender, and PTSD treatment outcomes of U.S. veterans. *J Traumatic Stress* 2015; 28(2): 92–101.
7. Walsh K, Koenen KC, Cohen GH, et al: Sexual violence and mental health symptoms among National Guard and Reserve soldiers. *J Gen Int Med* 2014; 29(1): 104–9.
8. Castro CA, Kintzle S, Schuyler AC, Lucas CL, Warner CH: Sexual assault in the military. *Curr Psychiatry Rep* 2015; 17(54): 1–13.
9. Stander VA, Thomsen CJ: Sexual harassment and assault in the U.S. Military: a review of policy and research trends. *J Mil Med* 2016; 181 (1 Suppl): 20–7.
10. Leardmann CA, Pietrucha A, Magruder KM, et al: Combat deployment is associated with sexual harassment or sexual assault in a large, female military cohort. *Women's Health Issues* 2013; 23(4): e215–23.
11. Morral AR, Gore KL, Schell T.: Sexual assault and sexual harassment in the US Military Volume 2: estimates for Department of Defense service members from the 2014 RAND military workplace study, 2015. Available at http://www.rand.org/pubs/research_reports/RR870z2-1.html; accessed July 8, 2016.
12. U.S. Department of Veterans Affairs: Understanding military culture: expression of values and ideals by service branch, 2016. Available at <http://www.mentalhealth.va.gov/communityproviders/docs/values.pdf>; accessed August 18, 2016.
13. Holland KJ, Rabelo VC, Cortina LM: Sexual assault training in the military: evaluating efforts to end the "invisible war". *Am J Commun Psychol* 2014; 54(3): 289–303.
14. Turchik JA, Wilson SM: Sexual assault in the U.S. military: a review of the literature and recommendations for the future. *Aggress Violent Behav* 2010; 15(4): 267–77.
15. Sadler AG, Booth BM, Cook BL, Doebbeling BN: Factors associated with women's risk of rape in the military environment. *Am J Indus Med* 2003; 43(3): 262–73.
16. Tilghman A: All combat jobs open to women in the military. *Military Times* 2015. Available at <http://www.militarytimes.com/story/military/pentagon/2015/12/03/carter-telling-military-open-all-combat-jobs-women/76720656/>; accessed July 10, 2016.
17. Nayak MB, Byrne CA, Martin MK, Abraham AG: Attitudes toward violence against women: a cross-nation study. *Sex Roles* 2003; 49(7–8): 333–42.
18. Rosen LN, Knudson KH, Fancher P: Cohesion and the culture of hyper-masculinity in U.S. Army units. *Armed Forces Soc* 2003; 29(3): 325–51.
19. Murnen SK, Wright C, Kaluzny G: If "boys will be boys," then girls will be victims? A meta-analytic review of the research that relates masculine ideology to sexual aggression. *Sex Roles* 2002; 46(11–12): 359–75.

20. U.S. Department of Defense: SAPRO Sexual Assault Prevention and Response Office. 2016. Available at <http://sapr.mil/index.php>; accessed May 5, 2017.
21. U.S. Department of Defense: 2014–2016 sexual assault prevention strategy. May 1, 2014. Available at http://www.sapr.mil/public/docs/reports/SecDef_Memo_and_DoD_SAPR_Prevention_Strategy_2014-2016.pdf; accessed June 1, 2016.
22. U.S. Army: SHARP sexual harassment/assault response & prevention. 2017. Available at <http://www.sexualassault.army.mil/index.cfm>; accessed May 5, 2017.
23. Gedney CR, Wood DS, Lundahl B, Butters RP: Sexual assault prevention efforts in the U.S. Air Force: a systematic review and content analysis. *J Interpersonal Violence* 2015. Available at <http://www.ncbi.nlm.nih.gov/pubmed/26450786>; accessed July 25, 2016.
24. U.S. Department of Defense: Prevention program elements. Sexual Assault Prevention and Response Office 2015, 2016. Available at <http://www.sapr.mil/index.php/prevention/prevention-program-elements>; accessed date May 5, 2017.
25. Tharp AT, DeGue S, Lang K, et al: Commentary on Foubert, Godin, & Tatum (2010): the evolution of sexual violence prevention and the urgency for effectiveness. *J Interpersonal Violence* 2011; 26(16): 3383–92.
26. Moher D, Liberati A, Tetzlaff J, Altman DG: Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Int J Surg* 2010; 8(5): 336–41.
27. Abbey A, McAuslan P, Ross LT: Sexual assault perpetration by college men: The role of alcohol, misperception of sexual intent, and sexual beliefs and experiences. *J Soc Clin Psychol* 1998; 17(2): 167–95.
28. U.S. Army: Army 2020: Generating Health & Discipline in the Force Ahead of the Strategic Reset. Washington, DC, US Army, 2012.
29. Oxford Centre For Evidence-Based Medicine Levels of Evidence Working Group: The Oxford 2011 Levels of Evidence. 2011. Available at www.cebm.net/ocebml-levels-of-evidence; accessed August 18, 2016.
30. Foubert JD, Masin RC: Effects of the men's program on U.S. Army soldiers' intentions to commit and willingness to intervene to prevent rape: a pretest posttest study. *Violence Victims* 2012; 27(6): 911–21.
31. Kelley ML, Schwerin ML, Farrar KL, Lane ME: An evaluation of a sexual assault prevention and advocacy program for U.S. Navy personnel. *J Mil Med* 2005; 170(4): 320–6.
32. Potter SJ, Moynihan MM: Bringing in the bystander: in-person prevention program to a U.S. military installation: results from a pilot study. *J Mil Med* 2011; 176(8): 870–5.
33. Potter SJ, Stapleton JG: Translating sexual assault prevention from a college campus to a United States military installation: piloting the know-your-power bystander social marketing campaign. *J Interpersonal Violence* 2012; 27(8): 1593–621.
34. Rau TJ, Merrill LL, McWhorter SK, et al: Evaluation of a sexual assault education/prevention program for male U.S. Navy personnel. *J Mil Med* 2010; 175(6): 429–34.
35. Rau TJ, Merrill LL, McWhorter SK, et al: Evaluation of a sexual assault education/prevention program for female U.S. Navy personnel. *J Mil Med* 2011; 176(10): 1178–83.
36. Banyard VL, Moynihan MM, Plante EG: Sexual violence prevention through bystander education: an experimental evaluation. *J Commun Psychol* 2007; 35(4): 463–81.
37. Foubert JD, Marriott KA: Effects of a sexual assault peer education program on men's belief in rape myths. *Sex Roles* 1997; 36(3–4): 259–68.
38. Potter SJ: Using a multimedia social marketing campaign to increase active bystanders on the college campus. *J Am Coll Health* 2012; 60(4): 282–95.
39. Check JV, Malamuth NM: Sex role stereotyping and reactions to depictions of stranger versus acquaintance rape. *J Personal Soc Psychol* 1983; 45(2): 344–56.
40. Gidycz CA, Orchowski LM, Edwards KM: Standards of primary prevention of sexual assault. In: *Violence Against Women and Children, Vol 2*: pp 159–79. Edited by Koss M, White JW Washington, DC, American Psychological Association, 2011.
41. DeGue S, Valle LA, Holt MK, Massetti GM, Matjasko JL, Tharp AT: A systematic review of primary prevention strategies for sexual violence perpetration. *Aggres Violent Behav* 2014; 19(4): 346–62.
42. Bray RM, Spira JL, Olmsted KR, Hout JJ: Behavioral and occupational fitness. *J Mil Med* 2010; 175(8S): 39–56.
43. Abbey A, Wegner R, Woerner J, Pegrum SE, Pierce J: Review of survey and experimental research that examines the relationship between alcohol consumption and men's sexual aggression perpetration. *Trauma Violence Abuse* 2014; 15(4): 265–82.
44. Teachman J, Anderson C, Tedrow LM: Military Service and Alcohol Use in the United States. *Armed Forces & Society* 2015; 41(3): 460–76.
45. Testa M, Livingston JA: Alcohol consumption and women's vulnerability to sexual victimization: can reducing women's drinking prevent rape? *Subst Use Misuse* 2009; 44(9–10): 1349–76.
46. Banyard VL: Measurement and correlates of prosocial bystander behavior: the case of interpersonal violence. *Violence Vict* 2008; 23(1): 83–97.
47. Malamuth NM: Rape proclivity among males. *J Soc Issues* 1981; 37(4): 138–57.
48. Payne DL, Lonsway KA, Fitzgerald LF: Rape myth acceptance: exploration of its structure and its measurement using the Illinois rape myth acceptance scale. *J Res Pers* 1999; 33(1): 27–68.
49. Grimley D, Prochaska JO, Velicer WF, Biaias LM, DiClemente CC: The transtheoretical model of change. In: *Changing the Self: Philosophies, Techniques, and Experiences*, pp 201–27. Edited by Brinthaup TM, Lipka RP Albany, NY, State University of New York Press, 1994.
50. Potter SJ, Moynihan MM: Bringing in the bystander: in-person prevention program to a U.S. military installation: results from a pilot study. *Mil Med* 2011; 176(8): 870–5.
51. Lonsway KA, Fitzgerald LF: Attitudinal antecedents of rape myth acceptance: a theoretical and empirical reexamination. *J Pers Soc Psychol* 1995; 68(4): 704.
52. Burt MR: Cultural myths and supports for rape. *J Pers Soc Psychol* 1980; 38(2): 217.
53. Deitz SR, Blackwell KT, Daley PC, Bentley BJ: Measurement of empathy toward rape victims and rapists. *J Pers Soc Psychol* 1982; 43(2): 372.