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Gender differences in mental health outcomes among Afghanistan veterans exposed to war zone trauma

Line Rønning[1] | Andreas Espetvedt Nordstrand[1,2] | Odin Hjemdal[1] |
Hans Jakob Bøe[2,3]

[1]Department of Psychology, Norwegian University of Science and Technology, Trondheim, Norway

[2]Institute of Military Psychiatry, Norwegian Armed Forces Joint Medical Services, Oslo, Norway

[3]Department of Psychology, University of Oslo, Oslo, Norway

Correspondence
Line Rønning, Norwegian University of Science and Technology (NTNU), Department of Psychology, NO-7491, Trondheim, Norway.
Email: line.ronning@ntnu.no

Abstract

Research has sought to identify whether women have an increased risk of developing mental health problems following military trauma compared to men, but the results are mixed. This study examined gender differences in a range of mental health outcomes within three levels of war zone trauma exposure and investigated gender differences in risk and protective factors associated with clinical mental health problems. Using data from a cross-sectional, postdeployment survey, a sample of Norwegian veterans of recent military operations in Afghanistan ($N = 6{,}205$, 8.3% women) were sorted according to reported war zone trauma exposure level (low, medium, high), then assessed for symptoms of posttraumatic stress disorder (PTSD), posttraumatic distress, anxiety, depression, insomnia, and alcohol problems. The findings revealed that men who reported low war zone exposure had lower levels of posttraumatic distress symptoms than women, $d = -0.20$, $p = .040$, but were more likely to report symptoms of alcohol problems within the low, $d = 0.33$, $p < .001$; medium, $d = 0.39$, $p < .001$; and high, $d = 0.37$, $p = .049$, exposure groups; however, these differences disappeared when all symptom variables were combined into one clinical mental health problem variable. Women with a clinical mental health problem were less likely to report war zone exposure than men, $OR = 0.93$, 95% CI [0.90, 0.97], $p = .001$. Findings suggest that although gender differences in mental health symptoms exist, male and female veterans with mental health problems may share more similarities than previously recognized.

Recent decades have witnessed an unprecedented number of women entering the military, leading to a growth in the number of women in the service and an expansion in the scope of roles filled by female personnel (e.g., Norwegian Armed Forces, 2023; Street et al., 2009). This shift has reduced gender differences in trauma exposure during international deployment, with 73.4% of women and 81.7% of men reporting some level of deployment-related combat exposure (Street et al., 2013). Concurrently, some trauma research suggests that women have a higher risk of mental health issues following exposure to major stressors than men (Heir et al., 2019; Kessler et al., 2017; Tolin & Foa,

2006; Xue et al., 2015), whereas other studies have reported no disproportionately higher risk for female military personnel compared to male personnel (Vogt et al., 2011). Mental health problems, including posttraumatic stress disorder (PTSD), have been shown to be associated with the operational readiness and preparedness of military units (Hoge et al., 2002; Kline et al., 2013), underscoring the need for further research clarifying the differential risks for negative outcomes in women and men. Accordingly, increased exposure to war zone experiences among women has provided researchers with the opportunity to investigate gender disparities in mental health outcomes when both genders encounter similar levels of trauma (i.e., low, medium, or high levels of war zone trauma).

Notably, several studies have sought to clarify whether gender is a potential predictor of increased mental health problems among veterans and military personnel. In some studies, women who were deployed in support of recent military operations in Afghanistan and Iraq have been found to report elevated scores on measures of PTSD, depression, anxiety, and insomnia symptoms when compared to male veterans (Foster et al., 2017; Hourani et al., 2015; Luxton et al., 2010; Xue et al., 2015); however, the findings have not been consistent across studies (Iversen et al., 2009; Maguen et al., 2010; Ramchand et al., 2015). Moreover, some research has suggested a reverse pattern of negative outcomes, with male veterans more likely to report alcohol problems than female veterans (Ramchand et al., 2015). These results could indicate that there are gender-specific patterns of psychological distress following trauma exposure, with men's posttraumatic reactions being different from, but not necessarily less distressing than, those of women (e.g., Gibbs, 1989). Most veteran studies have investigated a limited number of mental health outcomes, typically utilizing measures of PTSD symptoms, alcohol problems, or depressive symptoms (Ramchand et al., 2015). This may partially explain the conflicting findings across studies on gender differences in military personnel and veterans, as women tend to report more internalizing symptoms and are less likely to report externalizing symptoms than men (Gibbs, 1989; Tolin & Foa, 2006). The narrow focus on a few types of mental health problems may fail to capture the true extent of psychological suffering in male and female veterans and may obscure gender differences in the prevalence of trauma-related mental health problems in broader terms. Thus, studies examining gender differences in relation to both a wide range of mental health symptoms and overall rates of mental health suffering are needed.

Another possible explanation for the ambiguous findings regarding gender differences in trauma sequelae is that studies on military personnel and veterans infrequently control for civilian adverse life experiences. This is unfortunate, as military personnel frequently endorse a history of premilitary trauma exposure, which can significantly predict later mental health and functioning (Agorastos et al., 2014; Brownlow et al., 2018), and women have been shown to experience more lifetime stressors than men (Heir et al., 2019; Kessler et al., 2017; Vogt et al., 2011). Consequently, the failure to control for adverse life events in military studies when examining mental health problems among women and men may result in misleading interpretations of the results.

Although most individuals experience one or more traumatic events in their lifetime, only a subset will develop posttrauma mental health issues, such as PTSD (Kessler et al., 2017). This underscores the complex nature of trauma-related mental health problems, which may be particularly pertinent for veterans and military personnel. For example, research has demonstrated that negative social support is a strong predictor of PTSD (Christiansen & Elklit, 2008), with studies of veterans demonstrating a larger effect size than those involving civilian populations (Zalta et al., 2021). In addition, military personnel and veterans may face unique risk factors that are not applicable to the civilian population, such as the number and length of deployments, both of which have been associated with PTSD (Zalta et al., 2021; Xue et al., 2015). Therefore, when investigating trauma-related mental health problems among military personnel and veterans, it is crucial to consider the multitude of potential confounding factors that could influence outcomes.

The current study used data on a large Norwegian military population, all of whom had served at least one recent combat deployment in Afghanistan. The population included both active-duty service personnel and individuals who had left the military. In the context of the current study, the entire population is referred to as "Afghanistan veterans" or "veterans." This study focused on gender differences between male and female veterans who reported experiencing war zone trauma, specifically those who had at least one exposure while deployed to Afghanistan. The present study aimed to (a) examine gender differences in six mental health symptom scores (i.e., posttraumatic distress, anxiety, depression PTSD, insomnia, and alcohol problems) within three levels of war zone trauma exposure (i.e., low, medium, and high), (b) compare the proportion of men and women who met the clinical cutoff for mental health problems within these exposure levels, and (c) examine gender differences in risk and protective factors associated with clinical mental health problems. Based on the literature on gender differences in mental health problems among veterans deployed in support of recent military operations in Afghanistan and Iraq (e.g., Hourani et al., 2015; Ramchand et al., 2015; Xue et al., 2015), we hypothesized that men would report

more externalizing symptoms (e.g., alcohol problems), and women would experience more internalizing symptoms (e.g., anxiety). Furthermore, we expected that when scores on measures of six mental health problems were combined into a composite clinical mental health category, these differences would be attenuated, and both men and women would demonstrate similar rates of clinical mental health problems. Lastly, we hypothesized that risk and protective factors associated with mental health problems would differ for female and male veterans.

METHOD

Participants and procedure

A cross-sectional, postdeployment survey was carried out in 2020, with all Norwegian military personnel deployed to Afghanistan between 2001 and 2020 invited to participate ($N = 9,168$). The final sample size consisted of 6,205 participants (8.3% women). Variations in sample size due to missing demographic data and symptom-level responses are reflected in the number of participants associated with specific analyses. Data collection took place between September 2020 and November 2020. Participants gave their informed consent before responding to the survey. All procedures, data collection, and the storing and distribution of data were made in accordance with the legislation regulating the Norwegian Armed Forces Health Registry. The study was approved by the Regional Committee for Medical and Health Research Ethics of South-East Norway (Case Number 33032).

Measures

Demographic characteristics

Data on demographic variables were obtained through the Norwegian Armed Forces Health Registry and included information on age, gender, time since deployment, number of deployments, and deployment length. Additionally, participants provided information about their marital status and educational attainment and were asked to indicate whether they had left the armed forces after the last deployment.

General posttraumatic distress

The 10-item Posttraumatic Symptom Scale (PTSS-10; Holen et al., 1983), which was initially created by a Norwegian research team as part of their investigation on survivors of the 1980 North Sea oil rig disaster, was used to detect general posttraumatic stress reactions. The PTSS-10 is a self-report scale that covers general stress manifestations that can follow trauma exposure, such as sleep difficulties, irritability, depressed mood, and startle reactions in the past 7 days. Each item is rated on a Likert scale ranging from 1 (*never/rarely*) to 7 (*very often*), giving a total score of 10–70 ($n = 5,932$, $M = 16.1$, $SD = 8.4$). A cutoff score of 35 or higher was used to represent clinically significant general stress symptoms (Eid et al., 1999). The PTSS-10 has been shown to have good reliability and validity (Stoll et al., 1999) and demonstrated excellent internal reliability in the present sample, Cronbach's $\alpha = .91$.

PTSD symptoms

The PTSD Checklist for *DSM-5* (PCL-5; Weathers et al., 2013) is a 20-item self-report measure of PTSD symptoms based on criteria outlined in the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; American Psychiatric Association, 2013). The instrument was only available to individuals who reported experiencing, witnessing, learning about, or indirectly exposed to aversive details of a traumatic event during their Afghanistan deployment per *DSM-5* PTSD Criterion A. Respondents rated the frequency of past-month PTSD symptoms on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*), giving a possible score range of 0–80 ($n = 5,606$, $M = 5.9$, $SD = 9.6$). A clinical PTSD diagnosis was defined by a score of 2 (*moderately*) or higher on a PCL-5 item in addition to meeting the *DSM-5* diagnostic criteria, which includes endorsing a minimum of one item from Criterion B (Items 1–5), one item from Criterion C (Items 6–7), two items from Criterion D (Items 8–14), and two items from Criterion E (Items 15–20; Weathers et al., 2013). The PCL-5 has demonstrated strong psychometric properties in a Norwegian sample (Heir et al., 2019) and exhibited excellent internal reliability in the current sample, Cronbach's $\alpha = .95$.

Anxiety and depressive symptoms

The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) contains 14 items and consists of two subscales: Anxiety (HADS-A) and Depression (HADS-D). Items are rated on a 0–3 scale, giving a possible score range of 0–21 for both anxiety ($n = 5,926$, $M = 3.4$, $SD = 3.2$) and depression ($n = 5,926$, $M = 2.5$, $SD = 3.1$), with higher scores representing higher symptom levels. A sum score of 11 or higher on either subscale was used to represent clinically significant symptoms for both anxiety and depression (Zigmond & Snaith, 1983). The HADS has been shown to

have strong reliability and validity in Norwegian populations (Mykletun et al., 2001). In the current sample, both the HADS-A, Cronbach's α = .81, and HADS-D, Cronbach's α = .83, demonstrated acceptable internal reliability.

Insomnia

The Insomnia Severity Index (Bastien et al., 2001) is a seven-item, self-report instrument used to capture insomnia symptoms, and the respondent's degree of concerns or distress caused by such symptoms, within the last 2 weeks. Each item on the ISI is rated on a 5-point scale, giving a total score range of 0–28 (n = 5,936, M = 4.4, SD = 5.2), with higher scores representing higher symptom levels. We employed a sum score of 15 or higher to identify clinically significant insomnia (Morin et al., 2011). The ISI has been validated in a Norwegian sample (Filosa et al., 2021) and demonstrated excellent internal reliability in the current sample, Cronbach's α = .90.

Alcohol use problems

The Alcohol Use Disorder Identification Test (AUDIT; Babor et al., 2001) is a 10-item self-report questionnaire used to measure the quantity and frequency of alcohol use, symptoms of alcohol dependence, and alcohol-related consequences. Participants were asked to rate eight items on a 5-point scale ranging from 0 (*never*) to 4 (*daily or almost daily*). Additionally, two items were rated using scores of 0, 2, or 4, giving a total score range of 0–40, with higher scores indicating higher levels of alcohol problems (n = 5,743, M = 5.3, SD = 3.4). For this study, we used a cutoff score of 16 or higher to indicate clinically significant alcohol problems (Babor et al., 2001). The AUDIT has demonstrated strong validity and reliability in Norwegian samples (Gundersen et al., 2013) and demonstrated acceptable internal reliability in the presented sample, Cronbach's α = .72.

War zone exposures

The survey included a 20-item war zone stressor index describing a diverse range of typical war zone stressors that may have occurred during deployment. Index items were selected through a comprehensive research review (e.g., Shea et al., 2017; Stein et al., 2012); however, the scale has not yet been validated. Respondents rated the items using a 5-point Likert response format, with response options ranging from 0 (*not experienced*) to 4 (*experienced 50+ times*), giving a possible score of 0–80 (n = 6,157, M =

9.7, SD = 7.8), with higher scores indicating exposure to a higher load of war zone stressors.

Lifetime adverse experiences

Respondents were asked if they had experienced any of the following incidents as civilians: sexual harassment; bullying; physical violence; psychological violence; life-threatening illness or injury to someone close to them; the sudden or unexpected death to someone close to them; a breakup; a problem or serious conflict in a relationship with their partner, spouse, cohabitant, or children; a life-threatening illness; or a stressful experience or event, such as an accident, disaster, or fire. If participants confirmed exposure to an adverse life experience, they were also asked to specify whether this had occurred before or after 18 years of age, if relevant (several answers were possible). Adverse life experiences were measured using 11 items from adult life and nine items from childhood, and a dichotomous response format (i.e., "yes" or "no") was used. Possible scores ranged from 0 to 11 for adverse adult experiences (n = 5,936, M = 2.6, SD = 1.8) and 0 to 9 for adverse childhood experiences (n = 5,936, M = 1.1, SD = 1.3). In the analyses, adverse childhood and adult experience scores were treated as continuous variables to allow us to capture the potential cumulative effects of experiencing more than one adverse life event. The scale has not been validated for research purposes.

Perceived posttrauma social support

The Crisis Support Scale (CSS; Joseph et al, 1992) is a questionnaire designed to evaluate perceived social support following exposure to a traumatic event. As the current study focused on negative social support, only one item was included (i.e., "feeling let down by others"). Respondents provided their answers using a 5-point Likert scale ranging from 1 (*never*) to 5 (*all the time*), giving a possible score range of 1–5 (n = 5,921, M = 1.56, SD = .84). The CSS has demonstrated good reliability and validity in Scandinavia and has been utilized in Norwegian populations (Elklit et al., 2001; Heir et al., 2009).

Data analysis

We compared the characteristics of the study population by gender. To assess between-gender significance, chi-square statistics were utilized for categorical variables, and t tests were conducted for continuous variables. Our analyses were divided into three parts, each addressing a

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specific hypothesis. First, we conducted a factorial analysis of variance (ANOVA) to explore gender differences within the three levels of war zone trauma exposure for six postdeployment mental health symptom scores (i.e., symptoms of general posttraumatic distress, anxiety, depression, PTSD, insomnia, and alcohol problems). The three levels of war zone exposure were identified by dividing participants who reported experiencing war zone trauma into tertiles. Next, Tukey's post hoc comparison tests were conducted to compare men and women on each of the mental health symptoms within the three war zone exposure levels. The analyses were conducted with a bootstrapping method using 1,000 replications to estimate bias-corrected 95% confidence intervals (CI). We estimated the effect size of the difference using Cohen's d, where 0.20 indicates a small effect, 0.50 indicates a medium effect, and 0.80 indicates a large effect (Cohen, 1988). Second, we identified the proportion of men and women who met the cutoff for a potential mental health problem (i.e., a score above the cutoff for at least one of the mental health outcome measurements of interest) within the three war zone trauma levels. We used logistic regressions with odds ratios (ORs), and a bootstrapping method using 1,000 replications to estimate bias-corrected 95% confidence intervals, to examine associations between potential mental health problems and gender, with men serving as the reference group.

Third, we explored gender differences in risk and protective factors associated with potential mental health problems using multinomial logistic regression. Two comparisons were made: (a) women with mental health problems versus men with mental health problems and (b) women without mental health problems versus men without mental health problems. A bootstrapping method with 1,000 replications was applied to estimate bias-corrected 95% confidence intervals. As the proportion of missing data on all variables was less than 10%, missing data were not replaced (Bennett, 2001). The data were screened for multicollinearity, revealing low correlations (i.e., all < .40). The variance inflation factor (VIF) ranged from 1.03 to 1.24, far below the cutoff (i.e., 10.0), and all tolerance statistics exceeded the cutoff (i.e., 0.10), ranging between 0.81 and 0.97. We regarded p values less than .05 as statistically significant. Data analyses were conducted in Stata (Version 17; StataCorp, 2021).

RESULTS

Preliminary analyses

Table 1 presents gender-specific frequencies of demographic and military characteristics. Most notably, the average Afghanistan deployment length was higher for men compared to women, men reported significantly more deployments compared to women, and men were younger at the time of their first deployment. In addition, men were significantly more likely to experience a higher war zone exposure load, whereas women more often had no or low war zone trauma exposure.

When examining potential gender differences in relation to adverse life experiences, no significant differences emerged for childhood, $\chi^2(1, N = 5,936) = 3.27$, $p = .071$, or adult experiences, $\chi^2(1, N = 5,936) = 3.11$, $p = .078$. However, when investigating the number of reported adverse experiences, we found that women experienced a slightly higher number of adverse adult experiences compared to men (women: $M = 2.73$, $SD = 1.89$, men: $M = 2.56$, $SD = 1.82$), $t(5,934) = -2.04$, $p = .042$. There were no differences between men and women regarding the number of reported adverse childhood experiences (women: $M = 1.12$, $SD = 1.28$, men: $M = 1.14$, $SD = 1.35$), $t(5,934) = -0.38$, $p = .702$.

Gender differences in symptom severity and the prevalence of mental health problems

Two-way ANOVAs were conducted to examine the effect of gender and war zone exposure level on the six mental health outcomes. There was no significant interaction between gender and war zone exposure level for the PTSS, $p = .543$; HADS-A, $p = .856$; HADS-D, $p = .566$; PCL-5, $p = .875$; ISI, $p = .340$; or AUDIT, $p = .865$. The main effects of the ANOVAs can be found in the Supplementary Table S1. Pairwise comparisons of the means using Tukey's post hoc test (Table 2) revealed no differences between female and male veterans regarding symptoms of anxiety, depression, PTSD, or insomnia. However, men who experienced a low war zone trauma load had significantly lower scores for general posttraumatic distress (i.e., the PTSS) than women (men: $M = 14.09$, $SD = 6.00$, women: $M = 15.78$, $SD = 7.35$), $p = .040$, with a small effect size, $d = -0.20$. Furthermore, male veterans had significantly higher mean alcohol problem symptom scores compared to female veterans within the low (men: $M = 5.01$, $SD = 3.01$, women: $M = 3.90$, $SD = 2.46$), $p < .001$; medium (men: $M = 5.49$, $SD = 3.37$, women: $M = 4.18$, $SD = 2.36$), $p < .001$; and high war zone exposure levels (men: $M = 5.96$, $SD = 3.97$, women: $M = 4.71$, $SD = 2.93$), $p = .049$. Effect sizes were small within the low, $d = 0.33$; medium, $d = 0.39$; and high exposure levels, $d = 0.37$.

The logistic regression models examining associations between gender and scoring over the threshold for at least one clinical mental health problem did not demonstrate

TABLE 1 Demographic characteristics, by gender.

Variable	Women				Men				p
	n	%	M	SD	n	%	M	SD	
Age (years)	512		42.0	10.0	5,693		41.9	9.5	.846
Total Afghanistan deployment length (years)	510		0.6	0.4	5,669		0.7	0.5	< .001
Time since last Afghanistan deployment (years)	510		9.7	4.0	5,669		10.6	3.8	< .001
Number of Afghanistan deployments	510		3.8	3.1	5,669		4.3	3.3	< .001
Left the Norwegian Armed Forces after the final Afghanistan deployment	195	38.0			1,912	33.7			.043
With a spouse/partner	357	69.7			4,602	81.0			< .001
Educational attainment									
Primary school	1	0.2			71	1.3			.029
Secondary school	26	5.1			860	15.1			< .001
Vocational training	15	2.9			814	14.3			< .001
University, lower degree	169	33.0			2,063	36.3			.136
University, higher degree	301	58.8			1,873	33.0			< .001
War zone exposure load									
None	56	11.0			394	7.0			.001
Low	240	47.1			1,901	33.7			< .001
Medium	144	28.2			1,598	28.3			.976
High	70	13.7			1,754	31.1			< .001

Note: Some columns do not add up to the column total due to missing data.

any significant associations. Participants in the high-level war zone exposure group had the highest overall rate of clinical mental health problems for both genders (men: 17.1%, women: 24.6%, $n = 1,790$) $OR = 1.58$, 95% CI [0.87, 2.85], $p = .128$, followed by the medium exposure group, (men: 10.7%, women: 11.9%, $n = 1,713$), $OR = 1.13$, 95% CI [0.66, 1.93], $p = .666$. Only 5.5% of men and 6.8% of women in the low exposure group ($n = 2,103$) had a clinically significant mental health problem, $OR = 1.24$, 95% CI [0.69, 2.21], $p = .468$. The overall logistic regression models were not statistically significant for the low, $\chi^2(1, N = 2,103) = 0.53$, $p = .468$; medium, $\chi^2(1, N = 1,713) = 0.19$, $p = .666$; or high trauma load groups, $\chi^2(1, N = 1,790) = 2.31$, $p = .128$.

Gender differences in risk and protective factors

Table 3 presents the results of the multinomial regression analysis examining the associations between risk and protective factors and clinical mental health problems among male and female veterans. The overall logistic regression models were statistically significant both for the model comparing men and women with at least one clinical mental health problem, $\chi^2(8, N = 605) = 18.20$, $p = .020$, and the nonclinical model, $\chi^2(8, N = 4,858) = 174.29$, $p < .001$. Women with clinical mental health problems had reduced odds of reporting war zone exposure compared to men who had similar mental health problems. Conversely, women without clinical mental health problems had reduced odds of experiencing war zone exposure compared to men without clinical mental health problems but higher odds of endorsing adverse experiences during adulthood. Furthermore, women without clinical mental health problems had seen less time elapse since their last deployment and were more likely to have left the armed forces following their last deployment. They also had increased odds of feeling let down by others and reduced odds of having a spouse or partner compared to men without clinical mental health problems. For the results of analyses of within-gender differences, (i.e., women without mental health problems vs. women with mental health problems), see Supplementary Table S2.

DISCUSSION

The results of the present study revealed that there were gender differences in postdeployment mental health

TABLE 2 Gender differences in mean mental health symptom scores, by war zone exposure level.

Variable	Low exposure Men M	SD	Women M	SD	d	Medium exposure Men M	SD	Women M	SD	d	High exposure Men M	SD	Women M	SD	d
Posttraumatic distress	14.09	6.0	15.78*	7.35	−0.20	16.20	7.94	17.46	8.11	−0.15	18.31	10.53	20.97	11.09	−0.32
PTSD symptoms	2.50	4.79	2.51	4.55	−0.001	5.50	8.14	5.91	8.82	−0.05	10.29	12.80	10.06	11.22	0.03
Anxiety symptoms	2.75	2.73	3.24	2.87	−0.15	3.45	3.20	3.96	3.33	−0.16	4.18	3.65	4.91	4.04	−0.23
Depressive symptoms	1.98	2.57	1.64	2.36	0.11	2.54	3.06	2.57	3.28	−0.01	3.32	3.61	3.06	3.31	0.08
Insomnia symptoms	3.52	4.31	3.83	4.78	−0.06	4.43	5.06	5.09	5.23	−0.13	5.59	5.95	6.96	5.89	−0.27
Alcohol problems	5.01***	3.01	3.90	2.46	0.33	5.49***	3.37	4.18	2.36	0.39	5.96*	3.97	4.71	2.93	0.37

Note: Asterisks indicate that a group had a significantly higher mean symptom score.

*$p < .05$. ***$p < .001$.

symptoms between female and male veterans following exposure to war zone trauma. However, these differences were equalized when all symptom variables were combined into one clinical mental health problem variable. Similarly, there were no gender differences in risk and protective factors associated with clinical mental health problems, with the sole exception being that men reported higher levels of war zone trauma than women. In an era in which a larger proportion of women have served in the Norwegian Armed Forces and in a considerably wider variety of military service roles than ever before, our results contribute to a better understanding of gender differences in mental health outcomes as well as how risk and protective factors may be associated with post-deployment mental health problems in both men and women.

As hypothesized, the study demonstrates the existence of between-gender differences in reported symptoms of six mental health problems. These results are consistent with findings in veteran and military cohorts showing that women appear to have a higher risk of internalizing disorders, and men have a greater risk of experiencing externalizing disorders (Ramchand et al., 2015; Xue et al., 2015). In other words, men's posttraumatic reactions are different from, but not necessarily less distressing than, women's reactions. This is reflected in the equalization of gender differences when all symptom variables were combined into one clinical mental health problem variable. Thus, our findings may indicate that gender-specific differences following trauma exposure exist within different mental health areas, possibly resulting from differences in biology, cognition, and/or societal expectations (Tolin & Foa, 2006). This strengthens the assumption that gender does not affect total war zone trauma–related suffering, but women and men may perceive (Irish et al., 2011) and/or exhibit (Tolin & Foa, 2006) trauma-related symptoms differently.

As hypothesized, there were no significant gender differences in this sample of Norwegian veterans deployed to Afghanistan in terms of the presence of at least one clinical mental health problem within different war zone exposure levels. Unlike previous studies showing that women may demonstrate an increased vulnerability to developing mental health sequelae following combat exposure or war zone trauma (LeardMann et al., 2009; Luxton et al., 2010; Xue et al., 2015), we found that women did not seem to have a disproportionately higher risk compared to men even when war zone exposure load increased. This observation can be attributed to several factors, including a strict selection and screening procedure for international operations. Military personnel are typically selected for international service based on favorable health characteristics. Thus, a lower prevalence of mental health problems

TABLE 3 Multinomial regression of gender differences in risk and protective factors associated with mental health outcomes.

Variable	Men with MHP vs. women with MHP (n = 605)		Men without MHP vs. women without MHP (n = 4,858)	
	OR	95% CI	OR	95% CI
Trauma exposure type				
War zone exposure	0.93**	[0.90, 0.97]	0.91***	[0.89, 0.93]
Adverse childhood experiences	1.05	[0.86, 1.28]	0.96	[0.87, 1.05]
Adverse adult experiences	0.94	[0.79, 1.12]	1.11**	[1.04, 1.18]
Military variables				
Number of deployments	0.96	[0.83, 1.11]	0.99	[0.95, 1.02]
Years since end of last deployment	0.94	[0.86, 1.03]	0.94***	[0.91, 0.96]
Left the Norwegian Armed Forces after last deployment	0.63	[0.33, 1.20]	1.52***	[1.20, 1.91]
Social support				
Feeling let down by others	1.04	[0.81, 1.33]	1.44***	[1.28, 1.62]
Having a spouse/partner	0.55	[0.31, 1.00]	0.56***	[0.44, 0.71]

Note: MHP = Clinical mental health problem; OR = Odds ratio; CI = Confidence interval.

**$p < .01$. ***$p < .001$.

and higher levels of resilience are expected among the military and veteran cohorts compared to the general population. This phenomenon is commonly referred to as the "healthy soldier effect" (McLaughlin et al., 2008); in the present sample, this may have contributed to a reduction in commonly found gender discrepancies regarding factors relevant to mental health. Additionally, only volunteers are deployed, meaning that military personnel go through a self-selection process wherein they apply if they deem themselves fit and motivated for international missions. Consequently, the thorough selection process carried out by the Norwegian Armed Forces together with the volunteer self-selection process may work well in screening out individuals with a heightened risk of mental health problems. This may be a contributing factor to why women in the present sample appeared to be just as likely to develop clinical mental health problems as men regardless of war zone trauma exposure load.

When we explored gender differences in risk and protective factors associated with clinical mental health problems, only one difference emerged. This suggests that male and female veterans with clinical mental health problems might have shared backgrounds, experiences, and risk and/or protective factors contributing to their clinical mental health problems. The finding, which contradicted our initial hypothesis, aligns with previous studies that did not identify gender as a moderator in associations between risk and resilience factors, such as prior stressors, adverse childhood experiences, and social support, and mental health problems (e.g., PTSD; Carter-Visscher et al., 2010; Zalta et al., 2021). However, the absence of

significant findings in mental health outcomes and in regression models in our study could have been due to the lower number of female participants (e.g., Adams et al., 2021) or the selection of variables within the regression model; that is, research has indicated that female veterans often have different demographic backgrounds (e.g., higher levels of educational attainment, less likely to be married) and life experiences (e.g., more likely to experience sexual harassment) compared to male veterans (Adams et al., 2021; Hourani et al., 2016; Lehavot et al., 2018; Vogt et al., 2011). We did not account for these factors, which have been identified as potential risk or protective factors for mental health outcomes (Ramchand et al., 2015), in our models.

Although the study has several strengths, some limitations merit discussion. Our data were retrospective, self-reported, and cross-sectional, thus limiting our ability to infer causal associations. The long recall period following exposure to military stressors and other adverse life events represents another potential problem in utilizing such retrospective data. Furthermore, one's current psychological state may affect the recollection of mood-dependent memory (Southwick et al., 1997), meaning the presence or absence of psychological symptoms such as anxiety, depression, or PTSD might affect the recollection of past potential traumatic events. Furthermore, the study only measured alcohol problems and did not explore other drug use or abuse, which is a limitation. Regarding trauma exposure, research has shown that women are more likely to suffer from sexual harassment and abuse than men, which likely impacts their mental health (Kimerling et al.,

2010; Wilson, 2018); however, this was not explored in the present study. This study included several nonvalidated questionnaires (i.e., war zone traumatic experiences and adverse life experiences) as well as the Crisis Support Scale, which, to our knowledge, has not been validated for research in a Norwegian context. Future studies should examine whether using validated measurements yields the same results. Finally, this study included a volunteer sample, which may not be representative of all soldiers, especially those who did not volunteer for deployment. This should be taken into consideration when interpreting the results.

The findings of this study carry substantial implications for the Norwegian Armed Forces and other military organizations in terms of personnel policy, mental health services, and future research directions. Contrary to previous studies, the present results indicate that female veterans did not have a disproportionately higher risk of negative mental health outcomes compared to their male counterparts. Thus, the increased presence of female military service members and veterans worldwide does not seem to pose any additional risk to the operational readiness and preparedness of military units. Our research also highlights that men and women exhibit trauma symptoms differently, underscoring the need for mental health services to be tailored to address the unique needs and challenges faced by veterans of different genders. Finally, the study emphasizes the importance of assessing a wide range of mental health complaints following deployment. This appears to be crucial given the gender-specific patterns of mental health symptoms that our study revealed. Focusing solely on PTSD or other anxiety and stress disorders may have led to an assessment bias, with women appearing to be overrepresented in terms of mental health problems. To enhance understanding of gender differences in postdeployment mental health, future research should adopt a longitudinal approach and incorporate data on predeployment mental health status.

OPEN PRACTICES STATEMENT

The study reported in this article was not formally preregistered. Neither the data nor the materials have been made available on a permanent third-party archive; requests for the data or materials should be sent via email to the lead author at line.ronning@ntnu.no.

ORCID

Line Rønning https://orcid.org/0000-0001-8765-2957
Andreas Espetvedt Nordstrand https://orcid.org/0000-0002-2012-0574
Odin Hjemdal https://orcid.org/0000-0002-6430-2345
Hans Jakob Bøe https://orcid.org/0000-0002-1700-5196

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.