

# Military-related sexual assault in Canada: a cross-sectional survey

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## Abstract

**Background:** Most research on military-related sexual assault is based on the United States military and has important limitations, such as low response rates. We sought to estimate the lifetime prevalence of sexual assault, assess its relation to military service and identify the circumstances, correlates and associations with mental disorders of military-related sexual assault among Canadian military personnel.

**Methods:** We used the 2013 Canadian Forces Mental Health Survey, a cross-sectional representative survey of Canadian Regular Force personnel ( $n = 6696$ ). The sample was weighted to be representative of the entire Canadian Armed Forces Regular Force population in 2012 ( $n = 67\,776$ ), as per Statistics Canada requirements. We assessed lifetime trauma exposure and past-year mental disorders using the Composite International Diagnostic Interview. We defined lifetime military-related sexual assault as forced sexual activity or unwanted sexual touching that occurred on deployment or in another military workplace, or was perpetrated by Department of National Defence or Canadian Armed Forces personnel. We defined all other sexual assault as non-military-related sexual assault.

**Results:** Self-reported sexual assault was more prevalent among women (non-military-related sexual assault 24.2%, military-related sexual assault 15.5%) than men (5.9% and 0.8%, respectively). About a quarter of women with military-related sexual assault reported experiencing at least 1 event on deployment. After covariates were controlled for, military-related sexual assault was independently associated with any lifetime and any past-year mental disorder (adjusted odds ratio 2.9 and 3.0, respectively) and lifetime and past-year posttraumatic stress disorder (adjusted odds ratio 4.3 and 4.1, respectively).

**Interpretation:** Canadian military women are at increased risk for sexual assault and military-related sexual assault relative to their male counterparts. Deployment may be a period of elevated risk for military-related sexual assault, and women who reported military-related sexual assault are more likely to have experienced mental disorders, especially posttraumatic stress disorder.

Sexual assault contributes substantially to the burden of mental disorders, such as posttraumatic stress disorder (PTSD),<sup>1</sup> and may be particularly prevalent among military personnel. The military population consists largely of younger people, a group at risk for sexual assault.<sup>2-4</sup> Military members also often live in isolated, close quarters with one another,<sup>3,5</sup> with men greatly outnumbering and frequently outranking women.<sup>3,6</sup> Furthermore, some aspects unique to military-related sexual assault, such as the feelings of betrayal and continuous exposure to the perpetrator when he or she is a member of the same unit, may have a disproportionate influence on mental health.<sup>2,4,7,8</sup>

Most research on military-related sexual assault is based on the US military<sup>2-4,7,9</sup> and has substantial limitations, such as low response rates.<sup>10</sup> It may not, therefore, be generalizable to the Canadian military. Cotter<sup>11</sup> found lifetime military-related sexual assault rates of 27.3% and 3.8% among Canadian mili-

tary women and men, respectively. However, the study had important limitations, including its census design, and the results may not have been representative of the Canadian military as a whole.

To address these limitations and to gain a more accurate and extensive understanding of military-related sexual assault in Canada, we investigated the prevalence, circumstances, correlates

**Competing interests:** The authors are employed by the Department of National Defence. No other competing interests were declared.

This article has been peer reviewed.

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**CMAJ Open 2017. DOI:10.9778/cmajo.20160140**

and associations with mental disorders of lifetime military- and non-military-related sexual assault, beyond the effects of other lifetime trauma, in a representative sample of Canadian military personnel.

## Methods

### Data source and study population

The data source was the Canadian Forces Mental Health Survey, conducted by Statistics Canada between April and August 2013.<sup>12</sup> This survey contains a range of measures of mental health and its correlates. For the present analysis, the target population was the entire Canadian Regular Force in service when the survey frame was struck, in September 2012.

### Sampling and data collection

The Canadian Forces Mental Health Survey used a stratified random sampling framework to ensure the representativeness of the sample relative to the Canadian military as a whole. Interviews were conducted face-to-face by Statistics Canada personnel using a computer-assisted personal interview.

### Measures

We assessed lifetime and past-year prevalence of mental disorders (an aggregate variable of major depression, PTSD, generalized anxiety disorder or panic disorder) using the World Health Organization World Mental Health Composite International Diagnostic Interview,<sup>13</sup> a widely used, validated tool for assessing mental disorders. We used 4 outcomes to capture a range of current and past mental disorders that may be associated with sexual trauma: lifetime and past-year PTSD, and any lifetime and past-year mood or anxiety disorder.

We assessed lifetime exposure to nonsexual trauma with a sum score of a 26-item inventory of nonsexual potentially traumatic experiences of the Composite International Diagnostic Interview PTSD module. Higher scores indicate greater lifetime exposure to nonsexual trauma.

We measured lifetime sexual assault using the 2 items related to sexual trauma of the Composite International Diagnostic Interview PTSD module trauma inventory: forced sexual activity (“We define sexual assault as anyone forcing you or attempting to force you into any unwanted sexual activity, by threatening you, holding you down or hurting you in some way. Has this ever happened to you?”) and unwanted sexual touching (“Has anyone ever touched you against your will in any sexual way? By this I mean unwanted touching or grabbing, to kissing or fondling”). An affirmative response to either or both of these questions constituted lifetime sexual assault.

Respondents who replied “Yes” to either sexual assault item were asked 3 follow-up questions: “Did this ever take place while deployed on a Canadian Forces operation?”, “Did this ever take place in your Canadian Forces workplace (other than on deployment)?” and “Were any of the persons who committed this or these acts a Canadian Forces member or civilian Department of National Defence employee at the

time of this or these events?” We classified these participants into 2 mutually exclusive groups based on their responses to these questions: participants who responded affirmatively to any of the 3 questions (for forced sexual activity and/or unwanted touching) were categorized as having experienced military-related sexual assault, and the remaining participants were classified as having experienced lifetime non-military-related sexual assault. Participants who did not report any lifetime sexual assault based on the initial questions were classified into a third mutually exclusive group labelled “No lifetime sexual assault.”

The survey also assessed sociodemographic and military characteristics at the time of the interview, including age group, race, marital status, geographic region of the participant’s military base, rank category, military element and history of deployment.

### Statistical analysis

We used SPSS version 20 (IBM) and Stata version 13 (Stata-Corp) for the analyses; all results are weighted. By adjusting for initial sampling weights, outlying cases and participant nonresponse, Statistics Canada enabled the sample to be representative of the entire Canadian Armed Forces Regular Force population in 2012 ( $n = 67\,776$ ).<sup>12,14</sup> We estimated standard errors using linearization or bootstrap methods. Risk factors for military-related sexual assault and non-military-related sexual assault were identified with multinomial logistic regression. Covariates with an unadjusted association with the outcomes were included in the adjusted model. We restricted this analysis to women because of low event rates in men.

We assessed the adjusted and unadjusted associations between lifetime non-military-related sexual assault and military-related sexual assault and mental health outcomes (in women only) using 4 binary logistic regression models, 1 per outcome (lifetime PTSD, past-year PTSD, any lifetime mood or anxiety disorder, and any past-year mood or anxiety disorder). To compare models, we included the same covariates in all 4 models (specifically, those with an unadjusted relation with any of the outcomes).

The primary variable of lifetime sexual assault category was missing in cases representing less than 0.2% of the overall population. We used listwise deletion for missing values in the regression models, resulting in elimination of cases representing 2.5%–3.8% of the population in each model.

### Ethics approval

The data collection and data access procedures for the survey were reviewed and approved by the relevant policy committees at Statistics Canada that fulfill the functions of a Research Ethics Board, following the principles of the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans, if necessary.

## Results

Of the 8393 Regular Force members invited, 6696 participated, for a response rate of 79.8% (Table 1). The results of

the survey presented are weighted to the entire Canadian Regular Force in September 2012 ( $n = 64\ 280$ ), as per Statistics Canada requirements.

Of the 64 280 participants in the weighted survey, 7280 (11.3%) reported any lifetime sexual assault, which was more common among women (3540 [39.8%]) than men (3720 [6.7%]) (Table 2). The overall prevalence of lifetime non-military-related sexual assault was 8.5% (5440/64 280), with a higher proportion of women reporting it than men (24.2% [2160/8900] v. 5.9% [3260/55 360]). Fewer participants (1840 [2.9%]) reported military-related sexual assault, which was also more prevalent among female (460 [15.5%]) than male (1380 [0.8%]) members. Sexual touching was more prevalent than forced sexual activity among both women and men.

More than a quarter (27.5%) of women with military-related sexual assault reported that at least 1 instance had occurred on deployment (Table 3). More than half (58.7%) of the participants with military-related sexual assault stated that at least 1 event had occurred in a Canadian military workplace other than on deployment. Most participants (91.3%) who had experienced military-related sexual assault reported that it had been committed by a Canadian military member or a civilian Department of National Defence employee.

Risk factors for sexual assault are given in Table 4 and Table 5. In the final model (Table 5), being single (never married), living in the Western region, being a senior noncommissioned member or officer (all at the time of the survey) and having experienced more lifetime nonsexual traumatic events were independently associated with military-related sexual assault. Deployment had an association with military-related sexual assault in the unadjusted analysis that neutralized in the final model. Only being aged 40 years or more at the time of the survey and having experienced more lifetime nonsexual traumatic events were independently associated with non-military-related sexual assault.

Table 6 summarizes the associations between sexual assault category and mental health outcomes; detailed results are shown in Table 7, Table 8, Table 9 and Table 10. Four in 10 women (39.7%) with military-related sexual assault had had PTSD in their lifetime, and almost a quarter (23.5%) had past-year PTSD. After potentially confounding variables were controlled for, women who had experienced military-related sexual assault were about 3 times as likely as those with no sexual assault to have had any lifetime and any past-year mood or anxiety disorder, and about 4 times as likely to have had lifetime or past-year PTSD. Non-military-related sexual assault showed weaker and less consistent associations with the outcomes, although the odds ratios for military-related sexual assault and non-military-related sexual assault did not differ significantly.

## Interpretation

In this representative sample of Canadian military members, lifetime sexual assault was reported more commonly by women than by men, at rates of 24.2% and 5.9%, respectively, for non-military-related sexual assault and 15.5% and 0.8%,

respectively, for military-related sexual assault. Most incidents of sexual assault were unwanted sexual touching. Most cases of military-related sexual assault had been perpetrated by military or civilian Department of National Defence personnel and had

**Table 1: Sociodemographic and military characteristics of respondents (unweighted  $n = 6696$ )**

Characteristic	Weighted no.*† (%) of respondents	95% CI
<b>Sex</b>		
Male	55 480 (86.2)	85.3–87.0
Female	8920 (13.9)	13.0–14.7
<b>Age group, yr</b>		
17–24	8560 (13.3)	12.4–14.2
25–29	12 640 (19.6)	18.6–20.7
30–34	11 580 (18.0)	17.0–19.0
35–39	9220 (14.3)	13.4–15.3
40–44	8640 (13.4)	12.6–14.2
45–49	7820 (12.1)	11.4–12.9
50–69	7820 (9.2)	8.5–9.9
<b>Ethnicity</b>		
White	57 900 (90.1)	89.3–90.9
Other	6360 (9.9)	9.1–0.7
<b>Marital status</b>		
Single (never married)	17 300 (26.9)	25.8–28.0
Married/common-law	42 200 (65.6)	64.5–66.7
Widowed/divorced/separated	4840 (7.5)	6.9–8.2
<b>Region</b>		
Atlantic	14 480 (22.5)	21.5–23.5
Quebec	9740 (15.1)	14.3–16.0
Central/Ontario	23 660 (36.7)	35.5–38.0
Western	16 540 (25.7)	24.5–26.8
<b>Rank category‡</b>		
Junior noncommissioned member	35 440 (55.0)	54.8–55.2
Senior noncommissioned member	15 500 (24.1)	23.8–24.3
Officer	13 460 (20.9)	20.8–21.0
<b>Element</b>		
Army	34 220 (53.1)	51.9–54.3
Navy	11 100 (17.2)	16.3–18.2
Air Force	19 100 (29.7)	28.6–30.8
<b>Ever deployed</b>		
No	24 780 (38.5)	37.6–39.4
Yes		

Note: CI = confidence interval.

\*Weighted to the entire Canadian Regular Force in service in September 2012. To protect the identity of respondents, Statistics Canada permits the release only of weighted cell counts, which must be rounded to the nearest 20. We calculated prevalence rates using these rounded cell counts.

†Totals may not add up owing to rounding.

‡Junior noncommissioned member includes the ranks of Master Corporal/Master Seaman and below; senior noncommissioned member includes the ranks of Sergeant/Petty Officer 2nd class and above.

**Table 2: Prevalence of lifetime sexual assault by sex\***

Sexual assault category	Weighted no.†‡ (%) of participants (95% CI)		
	Men n = 55 380	Women n = 8900	Total n = 64 280
<b>No lifetime sexual assault</b>	51 640 (93.3) (92.6–94.0)	5360 (60.1) (56.8–63.3)	57 000 (88.7) (87.9–89.5)
<b>Lifetime non–military-related sexual assault</b>			
Forced sexual activity	–§	–§	–§
Unwanted sexual touching	3120 (5.6) (5.0–6.3)	2120 (23.8) (20.9–26.6)	5240 (8.2) (7.5–8.8)
Any sexual assault¶	3260 (5.9) (5.2–6.5)	2160 (24.2) (21.3–27.1)	5420 (8.4) (7.8–9.2)
<b>Lifetime military-related sexual assault**</b>			
Forced sexual activity	100 (0.2) (0.1–0.3)	680 (7.6) (5.9–9.5)	780 (1.2) (1.0–1.5)
Unwanted sexual touching	420 (0.8) (0.5–1.0)	1320 (14.8) (12.5–17.1)	1740 (2.7) (2.3–3.1)
Any sexual assault¶	460 (0.8) (0.6–1.1)	1380 (15.5) (13.1–17.8)	1840 (2.9) (2.5–3.3)

Note: CI = confidence interval.  
 \*Cases representing 0.19% of the population were excluded because of missing values.  
 †Weighted to the entire Canadian Regular Force in service in September 2012. To protect the identity of respondents, Statistics Canada permits the release only of weighted cell counts, which must be rounded to the nearest 20. We calculated prevalence rates using these rounded cell counts.  
 ‡Totals may not add up owing to rounding.  
 §These values are suppressed owing to Statistics Canada's guidelines for vetting of output. Although the cell sizes were above the prescribed minimum for this survey (unweighted  $n \geq 5$ ), earlier versions of the table released with minimally recoded variables had results that differed from these results by less than the minimum cell requirement and hence could not be released.  
 ¶Includes forced sexual activity and unwanted sexual touching, which are not mutually exclusive.  
 \*\*With or without lifetime non–military-related sexual assault.

**Table 3: Context of military-related sexual assault by sex**

Type of sexual assault; context	Weighted no.* (%) of participants (95% CI)		
	Men n = 460	Women n = 1380	Total n = 1840
<b>Forced sexual activity</b>			
While deployed on CAF mission	–†	160 (23.5) (12.7–34.3)	–†
Occurred in CAF workplace (other than deployment)	–†	420 (61.8) (49.6–74.0)	–†
Committed by CAF member or civilian DND employee	80 (80.0) (51.8–100.0)	620 (91.2) (84.5–97.9)	700 (89.7) (82.6–96.8)
Any forced sexual activity‡	100	680	780
<b>Unwanted sexual touching</b>			
While deployed on CAF mission	–†	360 (27.3) (19.5–35.0)	–†
Occurred in CAF workplace (other than deployment)	260 (61.9) (46.6–77.2)	780 (59.1) (50.4–67.8)	1040 (59.8) (52.2–67.4)
Committed by CAF member or civilian DND employee	380 (90.5) (79.7–100)	1240 (93.9) (90.6–97.3)	1620 (93.1) (89.2–97.0)
Any unwanted sexual touching‡	420	1320	1740
<b>Any sexual assault</b>			
While deployed on CAF mission	60 (13.0) (2.4–23.7)	380 (27.5) (20.0–35.1)	440 (23.9) (17.6–30.3)
Occurred in CAF workplace (other than deployment)	260 (56.5) (41.4–71.6)	820 (59.4) (51.0–67.8)	1080 (58.7) (51.3–66.1)
Committed by CAF member or civilian DND employee	380 (82.6) (70.9–94.3)	1300 (94.2) (90.5–97.9)	1680 (91.3) (87.2–95.4)
Any sexual assault‡	460	1380	1840

Note: CI = confidence interval, CAF = Canadian Armed Forces, DND = Department of National Defence.  
 \*Weighted to the entire Canadian Regular Force in service in September 2012. To protect the identity of respondents, Statistics Canada permits the release only of weighted cell counts, which must be rounded to the nearest 20. We calculated prevalence rates using these rounded cell counts.  
 †Insufficient data for presentation (does not meet Statistics Canada's minimum cell count requirements).  
 ‡This does not reflect the sum of the contexts, as the categories are not mutually exclusive.

occurred in a workplace other than on deployment. Deployment was associated with military-related sexual assault only in the unadjusted findings. Military-related sexual assault was associated with a greater number of lifetime nonsexual traumatic events as well as an increased risk of both lifetime and past-year mental disorders and PTSD.

The lifetime military-related sexual assault rates of 15.5% among women and 0.8% among men that we found are lower than the rates of 27.3% and 3.8%, respectively, that Cotter<sup>11</sup> recently found among Canadian military personnel. His study, however, focused exclusively on sexual misconduct. The use of a census framework and response rate of 61% sug-

**Table 4: Lifetime sexual assault category by sociodemographic and military risk factors, among women\***

Risk factor	Weighted no. †‡ (%) of participants (95% CI) § n = 8900			Total weighted no. ‡
	No lifetime sexual assault	Lifetime non-military-related sexual assault	Lifetime military-related sexual assault	
<b>Age group, yr</b>				
< 30	1780 (68.5) (62.1–74.9)	460 (17.7) (12.5–22.9)	340 (13.1) (8.3–17.9)	2600
30–39	1740 (58.8) (52.8–64.7)	760 (25.7) (20.3–31.1)	460 (15.5) (11.5–19.6)	2960
≥ 40	1840 (55.1) (49.8–60.4)	940 (28.1) (23.2–33.1)	580 (17.4) (13.5–21.2)	3340
<b>Ethnicity</b>				
White	4820 (60.9) (57.3–64.4)	1860 (23.5) (20.3–26.6)	1240 (15.7) (13.1–18.2)	7920
Other	540 (55.1) (44.1–66.1)	300 (30.6) (20.3–41.0)	140 (14.3) (7.0–21.6)	980
<b>Marital status</b>				
Single (never married)	1220 (53.0) (46.5–60.5)	560 (24.6) (18.4–30.8)	520 (22.8) (16.9–28.7)	2280
Married/common-law	3420 (62.0) (57.8–66.1)	1340 (24.4) (20.5–28.0)	760 (13.8) (11.1–16.6)	5500
Widowed/divorced/separated	720 (64.3) (54.4–74.2)	260 (23.2) (14.1–32.4)	120 (10.7) (4.9–16.5)	1120
<b>Region</b>				
Atlantic	1060 (65.4) (58.0–72.8)	380 (23.5) (16.9–30.0)	180 (11.1) (6.3–15.9)	1620
Quebec	780 (65.0) (55.9–74.1)	280 (23.3) (15.3–31.3)	140 (11.7) (5.2–18.1)	1200
Central/Ontario	2380 (61.3) (56.2–66.5)	960 (24.7) (20.1–29.4)	540 (13.9) (10.5–17.3)	3880
Western	1160 (52.3) (45.2–59.3)	540 (24.3) (18.0–30.6)	520 (23.4) (17.6–29.3)	2220
<b>Rank category ¶</b>				
Junior noncommissioned member	2760 (59.5) (54.2–64.8)	1320 (28.4) (23.5–33.4)	580 (12.5) (9.0–16.0)	4640
Senior noncommissioned member	1180 (58.4) (52.4–64.4)	420 (20.8) (15.9–25.7)	420 (20.8) (15.9–25.7)	2020
Officer	1440 (63.7) (58.3–69.2)	440 (19.5) (15.1–23.9)	380 (16.8) (12.5–21.1)	2260
<b>Element</b>				
Army	2400 (60.0) (54.9–65.1)	1000 (25.0) (20.4–29.6)	620 (15.5) (11.8–19.2)	4000
Navy	940 (60.3) (52.6–68.0)	320 (20.5) (14.3–26.7)	300 (19.2) (13.0–25.5)	1560
Air Force	2040 (61.1) (55.5–66.6)	860 (25.7) (20.6–30.9)	460 (13.8) (10.1–17.4)	3340
<b>Ever deployed</b>				
No	2860 (64.4) (59.3–69.5)	1040 (23.4) (18.8–28.0)	540 (12.2) (8.8–15.5)	4440
Yes	2500 (56.1) (51.6–60.5)	1140 (25.6) (21.7–29.5)	840 (18.8) (15.3–22.3)	4460
No. of types of lifetime nonsexual trauma, mean (95% CI)	2.10 (1.91–2.29)	3.96 (3.55–4.37)	4.90 (4.32–5.45)	2.99 (2.80–3.18)

Note: CI = confidence interval.

\*Cases representing 0.2% of the population were excluded because of missing values.

†Weighted to the entire Canadian Regular Force in service in September 2012. To protect the identity of respondents, Statistics Canada permits the release only of weighted cell counts, which must be rounded to the nearest 20. We calculated prevalence rates using these rounded cell counts.

‡Totals may not add up owing to rounding.

§Except where noted otherwise.

gest potential selection bias, such that members who had experienced sexual assault may have been more likely to respond than members who had not experienced sexual assault. Cotter used an online survey, and the greater per-

ceived anonymity may have increased reporting. In his definition of military-related sexual assault, Cotter included, in addition to forced sexual activity and unwanted sexual touching, an item assessing sexual activity without consent. With

**Table 5: Association of sociodemographic and military characteristics with lifetime sexual assault category among women\*†**

Characteristic	Relative risk ratio (95% CI)‡ Weighted <i>n</i> = 8900§			
	Unadjusted		Adjusted	
	Lifetime non-military-related sexual assault v. no sexual assault	Lifetime military-related sexual assault v. no sexual assault	Lifetime non-military-related sexual assault v. no sexual assault	Lifetime military-related sexual assault v. no sexual assault
<b>Age group, yr</b>				
< 30	Reference	Reference	Reference	Reference
30–39	1.66 (1.05–2.62)	1.36 (0.80–2.31)	1.62 (0.98–2.66)	1.22 (0.67–2.23)
≥ 40 yr	1.93 (1.22–3.05)	1.64 (0.98–2.74)	2.10 (1.20–3.67)	1.44 (0.79–2.65)
<b>Ethnicity</b>				
White	Reference	Reference	–¶	–¶
Other	1.44 (0.84–2.49)	1.06 (0.54–2.11)	–¶	–¶
<b>Marital status</b>				
Single (never married)	1.19 (0.79–1.81)	1.91 (1.24–2.94)	1.57 (0.98–2.52)	2.58 (1.56–4.25)
Married/common-law	Reference	Reference	Reference	Reference
Widowed/divorced/separated	0.93 (0.52–1.66)	0.78 (0.39–1.56)	0.73 (0.38–1.41)	0.62 (0.29–1.35)
<b>Region</b>				
Atlantic	0.90 (0.55–1.46)	0.77 (0.43–1.40)	0.97 (0.57–1.64)	1.01 (0.52–1.97)
Quebec	0.89 (0.51–1.57)	0.84 (0.41–1.72)	0.87 (0.48–1.57)	1.02 (0.48–2.14)
Ontario	Reference	Reference	Reference	Reference
Western	1.16 (0.74–1.83)	1.97 (1.27–3.07)	1.16 (0.71–1.88)	2.34 (1.47–3.72)
<b>Rank category</b>				
Junior noncommissioned member	Reference	Reference	Reference	Reference
Senior noncommissioned member	0.75 (0.49–1.14)	1.76 (1.11–2.78)	0.64 (0.39–1.06)	1.93 (1.11–3.35)
Officer	0.64 (0.44–0.93)	1.29 (0.81–2.06)	0.75 (0.49–1.14)	2.05 (1.21–3.45)
<b>Element</b>				
Army	Reference	Reference	–¶	–¶
Navy	0.81 (0.51–1.30)	1.28 (0.78–2.10)	–¶	–¶
Air Force	1.00 (0.68–1.48)	0.87 (0.55–1.38)	–¶	–¶
<b>Ever deployed</b>				
No	Reference	Reference	Reference	Reference
Yes	1.25 (0.88–1.78)	1.75 (1.17–2.64)	0.76 (0.51–1.15)	0.86 (0.54–1.37)
Count of types of lifetime nonsexual trauma	1.33 (1.24–1.44)	1.46 (1.34–1.60)	1.34 (1.23–1.45)	1.51 (1.37–1.66)

Note: CI = confidence interval.  
\*Multinomial logistic regression.  
†Cases representing 0.2% of the population were excluded because of missing values.  
‡Results are presented as relative risk ratios as opposed to odds ratios so as to provide more comparable estimates of effect size across covariates and outcomes.  
§Weighted to the entire Canadian Regular Force in service in September 2012. To protect the identity of respondents, Statistics Canada permits the release only of weighted cell counts, which must be rounded to the nearest 20. We calculated prevalence rates using these rounded cell counts.  
¶Not included in final model owing to the lack of an unadjusted association with the outcome.

rates of 8.7% and 0.7% among women and men, respectively, this third experience may have contributed to the increased overall prevalence in Cotter’s study.

The rates of lifetime sexual assault that we found did not differ substantially from those reported in a study in the Canadian general population that used the same items as we did (forced sexual activity and unwanted sexual touching).<sup>1</sup> Although comparing rates of military-related sexual assault across studies is complicated by methodological differences,<sup>2,3,7,9,15</sup> the prevalence rates we observed are slightly lower than those reported in a meta-analysis of primarily US-based research (23.6% for women and 1.9% for men).<sup>15</sup>

Previous research has shown deployment, especially with combat, to be a period of risk for military-related sexual assault,<sup>16,17</sup> owing to factors such as lengthy periods without permitted sexual activity and close living quarters combining men with relatively few women.<sup>6</sup> We did not find an elevated adjusted risk of military-related sexual assault among women who had been deployed in the past. However, this null finding was likely due to differences in incidence- and prevalence-oriented measures in the context of multiple potential military-related sexual assault events.<sup>18</sup> More than a quarter of women with military-related sexual assault reported that at least 1 event had occurred on deployment, despite the relatively short time military personnel spend deployed. This finding indicates that military-related sexual assault may be more likely to occur on deployment.

Also consistent with past research, military-related sexual assault was associated with an increased likelihood of having a

mental disorder, particularly PTSD. The odds of these mental disorders did not differ significantly between women who reported military-related sexual assault and non-military-related sexual assault. However, the odds were higher among women with military-related sexual assault, which is in line with previous findings that military-related sexual assault may be more psychologically harmful than non-military-related sexual assault.<sup>2,4,7,8</sup>

**Limitations**

Some limitations of our study must be considered. The data were self-reported and were collected in face-to-face interviews, which is associated with variability in reporting of assault.<sup>9</sup> The study was cross-sectional, so we could not determine the direction of the association between sexual assault and mental disorders. Because the survey assessed only the prevalence and not the incidence of sexual assault, we could not examine cumulative effects of sexual assault on mental health. We also could not determine, among those with military-related sexual assault, how much, if any, non-military-related sexual assault they had experienced, which is especially important given the role that prior sexual assault may play in subsequent assault.<sup>19,20</sup> Moreover, because the sociodemographic information was collected at the time of the interview, we could not determine whether variables such as marital status or region were risk factors for military-related sexual assault at the time of occurrence. Finally, the low prevalence of military-related sexual assault among men precluded any analysis of its risk factors or associations with

**Table 6: Prevalence of mental health outcomes and association between lifetime sexual assault and mental health outcomes among women\*†‡**

Variable	Mental health outcome; weighted no.§ (%) of participants (95% CI) n = 8580–8700			
	Any lifetime mood or anxiety disorder	Any past-year mood or anxiety disorder	Lifetime PTSD	Past-year PTSD
Overall	3620 (41.9) (38.5–45.3)	1760 (20.5) (17.6–23.4)	1640 (18.9) (16.0–21.8)	760 (8.7) (6.6–10.9)
No lifetime sexual assault	1580 (30.3) (26.4–34.1)	700 (13.5) (10.4–16.6)	420 (8.0) (5.5–10.4)	200 (3.8) (2.1–5.5)
Lifetime non-military-related sexual assault	1120 (54.9) (47.1–62.7)	500 (24.8) (18.5–31.0)	660 (32.7) (25.6–39.7)	240 (11.7) (6.6–16.7)
Military-related sexual assault	900 (66.2) (58.0–74.3)	560 (41.2) (32.7–49.6)	540 (39.7) (31.1–48.3)	320 (23.5) (16.2–30.9)
	Adjusted OR¶ (95% CI)			
Lifetime non-military-related sexual assault v. no lifetime sexual assault	1.87 (1.23–2.85)	1.58 (0.93–2.68)	3.68 (2.14–6.34)	2.14 (0.94–4.86)
Military-related sexual assault v. no lifetime sexual assault	2.88 (1.85–4.50)	3.00 (1.79–5.05)	4.32 (2.27–8.20)	4.06 (1.62–10.21)

Note: CI = confidence interval, OR = odds ratio, PTSD = posttraumatic stress disorder.

\*Summary of final binary logistic regression models.

†Cases representing 2.5%–3.8% of the population were excluded from the final model because of missing values.

‡Detailed regression results are shown in Tables 7–10.

§Weighted to the entire Canadian Regular Force in service in September 2012. To protect the identity of respondents, Statistics Canada permits the release only of weighted cell counts, which must be rounded to the nearest 20. We calculated prevalence rates using these rounded cell counts.

¶Adjusted for age group, marital status, region, rank category, element, deployment history and number of lifetime nonsexual traumatic events.

**Table 7: Association of lifetime sexual assault with any lifetime mood or anxiety disorder\* among women†‡**

Variable	Weighted no.§ (%) of participants (95% CI)¶ <i>n</i> in final model = 8620	Unadjusted OR (95% CI)	Adjusted OR** (95% CI)
<b>Age group, yr</b>			
< 30	820 (31.5) (25.0–38.1)	Reference	Reference
30–39	1240 (43.7) (37.6–49.7)	1.65 (1.12–2.43)	1.50 (0.96–2.33)
≥ 40 yr	1560 (48.4) (43.0–53.9)	2.00 (1.38–2.90)	1.74 (1.07–2.81)
<b>Ethnicity</b>			
White	3240 (42.2) (38.5–45.9)	Reference	–††
Other	400 (41.7) (30.8–52.6)	0.94 (0.56–1.59)	–††
<b>Marital status</b>			
Single (never married)	1020 (45.5) (38.5–52.6)	1.33 (0.97–1.84)	1.59 (1.06–2.37)
Married/common-law	2040 (38.2) (34.0–42.4)	Reference	Reference
Widowed/divorced/separated	560 (53.8) (43.1–64.6)	1.99 (1.22–3.24)	1.98 (1.13–3.44)
<b>Region</b>			
Atlantic	660 (41.8) (33.9–49.7)	1.05 (0.72–1.53)	1.32 (0.85–2.06)
Quebec	460 (39.7) (30.3–49.0)	0.95 (0.58–1.55)	0.97 (0.53–1.76)
Central/Ontario	1500 (40.1) (34.8–45.4)	Reference	Reference
Western	1020 (47.2) (40.0–54.4)	1.35 (0.94–1.94)	1.28 (0.86–1.91)
<b>Rank category</b>			
Junior noncommissioned member	2000 (44.4) (39.0–49.9)	Reference	Reference
Senior noncommissioned member	840 (42.9) (36.8–49.0)	0.95 (0.67–1.35)	0.74 (0.48–1.14)
Officer	780 (35.5) (30.0–40.9)	0.68 (0.49–0.95)	0.77 (0.53–1.12)
<b>Element</b>			
Army	1780 (45.2) (39.9–50.5)	Reference	Reference
Navy	540 (35.5) (27.8–43.3)	0.66 (0.45–0.98)	0.73 (0.46–1.16)
Air Force	1300 (40.6) (34.9–46.3)	0.82 (0.59–1.12)	0.88 (0.61–1.27)
<b>Ever deployed</b>			
No	1520 (35.3) (24.3–46.4)	Reference	Reference
Yes	2100 (48.4) (43.8–52.9)	1.74 (1.29–2.36)	1.20 (0.83–1.72)
<b>Lifetime sexual trauma category</b>			
No lifetime sexual trauma	1580 (30.3) (26.1–34.4)	Reference	Reference
Lifetime non–military-related sexual assault only	1120 (54.9) (47.6–62.2)	2.82 (1.91–4.16)	1.87 (1.23–2.85)
Lifetime military-related sexual assault (± non–military-related sexual assault)	900 (66.2) (58.3–74.1)	4.63 (3.12–6.89)	2.88 (1.85–4.50)
<b>Count of types of lifetime nonsexual trauma, mean (95% CI)</b>			
All respondents	2.97 (2.77–3.16)	1.33 (1.25–1.41)	1.22 (1.14–1.31)
Respondents without any lifetime mood or anxiety disorder	2.13 (1.94–2.32)		
Respondents with any lifetime mood or anxiety disorder	4.13 (3.88–4.47)		
<p>Note: CI = confidence interval, OR = odds ratio.  *Any of posttraumatic stress disorder, major depression, panic disorder or generalized anxiety disorder.  †Binary logistic regression.  ‡Cases representing 3.4% of the population were excluded from the final model because of missing values.  §Weighted to the entire Canadian Regular Force in service in September 2012. To protect the identity of respondents, Statistics Canada permits the release only of weighted cell counts, which must be rounded to the nearest 20. We calculated prevalence rates using these rounded cell counts.  ¶Except where noted otherwise.  **Adjusted for age group, marital status, region, rank category, element, deployment history and number of lifetime nonsexual traumatic events.  ††Not included in final model owing to the lack of an unadjusted association with the outcome.</p>			



**Table 8: Association of lifetime sexual assault with any past-year mood or anxiety disorder among women\*†**

Variable	Weighted no.‡ (%) of participants (95% CI)§ <i>n</i> in final model = 8580	Unadjusted OR (95% CI)	Adjusted OR¶ (95% CI)
<b>Age group, yr</b>			
< 30	460 (17.8) (12.2–23.4)	Reference	Reference
30–39	740 (26.1) (20.7–31.4)	1.65 (1.00–2.70)	1.51 (0.84–2.69)
≥ 40 yr	560 (17.5) (13.3–21.7)	0.99 (0.61–1.61)	0.76 (0.39–1.49)
<b>Ethnicity</b>			
White	1600 (20.9) (17.9–24.0)	Reference	–**
Other	160 (17.0) (8.8–25.3)	0.81 (0.42–1.54)	–**
<b>Marital status</b>			
Single (never married)	540 (24.3) (18.1–30.6)	1.57 (1.06–2.34)	1.53 (0.96–2.44)
Married/common-law	920 (17.2) (13.9–20.5)	Reference	Reference
Widowed/divorced/separated	320 (30.8) (20.8–40.7)	2.14 (1.25–3.65)	2.44 (1.33–4.50)
<b>Region</b>			
Atlantic	340 (21.5) (14.7–28.3)	1.34 (0.83–2.17)	1.60 (0.92–2.79)
Quebec	240 (20.3) (12.6–28.0)	1.30 (0.70–2.39)	1.19 (0.58–2.44)
Central/Ontario	620 (16.7) (12.5–20.8)	Reference	Reference
Western	580 (27.1) (20.8–33.4)	1.84 (1.17–2.88)	1.59 (0.98–2.59)
<b>Rank category</b>			
Junior noncommissioned member	1000 (22.4) (17.8–27.1)	Reference	Reference
Senior noncommissioned member	400 (20.6) (15.5–25.7)	0.90 (0.59–1.37)	0.90 (0.53–1.53)
Officer	360 (16.4) (12.1–20.6)	0.68 (0.45–1.02)	0.78 (0.49–1.22)
<b>Element</b>			
Army	900 (23.1) (18.5–27.6)	Reference	Reference
Navy	320 (21.3) (14.4–28.3)	0.92 (0.57–1.50)	1.01 (0.58–1.78)
Air Force	560 (17.6) (13.3–22.0)	0.70 (0.46–1.06)	0.80 (0.50–1.29)
<b>Ever deployed</b>			
No	700 (16.1) (12.1–20.2)	Reference	Reference
Yes	1080 (25.4) (21.3–29.4)	1.74 (1.18–2.58)	1.52 (0.93–2.68)
<b>Lifetime sexual trauma category</b>			
No lifetime sexual trauma	1580 (30.3) (26.1–34.4)	Reference	Reference
Non–military-related sexual assault only	1120 (54.9) (47.6–62.2)	2.06 (1.30–3.27)	1.58 (0.93–2.68)
Military-related sexual assault (± non–military-related sexual assault)	900 (66.2) (58.3–74.1)	4.46 (2.90–6.86)	3.00 (1.79–5.05)
<b>Count of types of lifetime nonsexual trauma, mean (95% CI)</b>			
All respondents	2.95 (2.76–3.15)	1.23 (1.15–1.31)	1.15 (1.07–1.24)
Respondents without any past-year mood or anxiety disorder	2.59 (2.39–2.78)		
Respondents with any past-year mood or anxiety disorder	4.37 (3.84–4.89)		

Note: CI = confidence interval, OR = odds ratio.

\*Binary logistic regression.

†Cases representing 3.8% of the population were excluded from the final model because of missing values.

‡Weighted to the entire Canadian Regular Force in service in September 2012. To protect the identity of respondents, Statistics Canada permits the release only of weighted cell counts, which must be rounded to the nearest 20. We calculated prevalence rates using these rounded cell counts.

§Except where noted otherwise.

¶Adjusted for age group, marital status, region, rank category, element, deployment history and number of lifetime nonsexual traumatic events.

\*\*Not included in final model owing to the lack of an unadjusted association with the outcome.

**Table 9: Association of lifetime sexual assault with lifetime PTSD among women\*†**

Variable	Weighted no.‡ (%) of participants (95% CI)§ <i>n</i> in final model = 8660	Unadjusted OR (95% CI)	Adjusted OR¶ (95% CI)
<b>Age group, yr</b>			
< 30 yr	380 (14.6) (9.5–19.7)	Reference	Reference
30–39	580 (20.4) (15.4–25.4)	1.53 (0.90–2.62)	1.49 (0.78–2.83)
≥ 40	680 (21.0) (16.4–25.6)	1.62 (0.96–2.72)	1.42 (0.70–2.91)
<b>Ethnicity</b>			
White	1440 (18.7) (15.7–21.6)	Reference	–**
Other	200 (21.3) (12.5–30.0)	1.19 (0.69–2.07)	–**
<b>Marital status</b>			
Single (never married)	520 (23.2) (17.0–29.5)	1.60 (1.04–2.45)	1.68 (0.95–2.95)
Married/common-law	860 (15.9) (12.7–19.1)	Reference	Reference
Widowed/divorced/separated	260 (25.5) (15.9–35.1)	1.77 (1.01–3.11)	2.01 (1.00–4.04)
<b>Region</b>			
Atlantic	220 (13.9) (8.6–19.2)	0.63 (0.37–1.08)	0.69 (0.37–1.31)
Quebec	160 (13.6) (7.1–20.0)	0.67 (0.35–1.28)	0.54 (0.25–1.21)
Central/Ontario	760 (20.2) (15.7–24.7)	Reference	Reference
Western	480 (22.2) (16.0–28.4)	1.16 (0.73–1.82)	0.99 (0.56–1.74)
<b>Rank category</b>			
Junior noncommissioned member	1000 (22.3) (17.7–27.0)	Reference	Reference
Senior noncommissioned member	400 (20.2) (15.2–25.2)	0.91 (0.59–1.41)	0.81 (0.45–1.45)
Officer	240 (10.8) (7.4–14.2)	0.41 (0.26–0.65)	0.51 (0.29–0.90)
<b>Element</b>			
Army	820 (20.7) (16.2–25.2)	Reference	Reference
Navy	220 (14.5) (8.7–20.2)	0.64 (0.36–1.13)	0.86 (0.43–1.32)
Air Force	600 (18.6) (14.1–23.2)	0.85 (0.55–1.31)	0.94 (0.57–1.56)
<b>Ever deployed</b>			
No	720 (16.5) (12.3–20.7)	Reference	Reference
Yes	920 (21.3) (17.6–25.0)	1.38 (0.93–2.04)	0.80 (0.49–1.32)
<b>Lifetime sexual trauma category</b>			
No lifetime sexual trauma	1580 (30.3) (26.1–34.4)	Reference	Reference
Non–military-related sexual assault only	1120 (54.9) (47.6–62.2)	5.62 (3.46–9.13)	3.68 (2.14–6.34)
Military-related sexual assault (± non–military-related sexual assault)	900 (66.2) (58.3–74.1)	7.74 (4.75–12.60)	4.32 (2.27–8.2)
<b>Count of types of lifetime nonsexual trauma, mean (95% CI)</b>			
All respondents	2.95 (2.76–3.14)	1.42 (1.32–1.52)	1.32 (1.21–1.44)
Respondents without any lifetime PTSD	2.40 (2.21–2.57)		
Respondents with any lifetime PTSD	5.33 (4.79–5.87)		
<p>Note: CI = confidence interval, OR = odds ratio, PTSD = posttraumatic stress disorder.  *Binary logistic regression.  †Cases representing 2.9% of the population were excluded from the final model because of missing values.  ‡Weighted to the entire Canadian Regular Force in service in September 2012. To protect the identity of respondents, Statistics Canada permits the release only of weighted cell counts, which must be rounded to the nearest 20. We calculated prevalence rates using these rounded cell counts.  §Except where noted otherwise.  ¶Adjusted for age group, marital status, region, rank category, element, deployment history and number of lifetime nonsexual traumatic events.  **Not included in final model owing to the lack of an unadjusted association with the outcome.</p>			

**Table 10: Association of lifetime sexual assault with past-year PTSD among women\*†**

Variable	Weighted no.‡ (%) of participants (95% CI)§ n in final model = 8700	Unadjusted OR (95% CI)	Adjusted OR¶ (95% CI)
<b>Age group, yr</b>			
< 30	200 (7.7) (3.5–11.9)	Reference	Reference
30–39	320 (11.2) (7.2–15.1)	1.55 (0.73–3.29)	1.48 (0.61–3.57)
≥ 40	240 (7.4) (4.5–10.3)	0.93 (0.44–1.99)	0.62 (0.24–1.59)
<b>Ethnicity</b>			
White	680 (8.8) (6.5–11.0)	Reference	–**
Other	100 (10.6) (4.6–16.6)	1.12 (0.52–2.41)	–**
<b>Marital status</b>			
Single (never married)	280 (12.5) (7.4–17.6)	1.92 (1.06–3.47)	1.75 (0.84–3.64)
Married/common-law	360 (6.7) (4.5–8.8)	Reference	Reference
Widowed/divorced/separated	140 (13.5) (5.8–21.1)	1.99 (0.84–4.68)	2.58 (0.91–7.25)
<b>Region</b>			
Atlantic	100 (6.3) (3.1–9.4)	0.54 (0.25–1.16)	0.63 (0.26–1.57)
Quebec	60 (5.1) (1.4–8.8)	0.47 (0.16–1.38)	0.34 (0.10–1.15)
Central/Ontario	380 (10.1) (6.4–13.7)	Reference	Reference
Western	240 (11.2) (6.6–15.8)	1.08 (0.57–2.04)	0.88 (0.41–1.87)
<b>Rank category</b>			
Junior noncommissioned member	460 (10.2) (6.7–13.7)	Reference	Reference
Senior noncommissioned member	180 (9.1) (5.3–12.9)	0.92 (0.5–1.72)	0.96 (0.44–2.13)
Officer	120 (5.4) (3.0–7.9)	0.47 (0.26–0.95)	0.67 (0.29–1.55)
<b>Element</b>			
Army	420 (10.7) (7.2–14.1)	Reference	Reference
Navy	100 (6.6) (2.3–10.8)	0.64 (0.29–1.44)	0.84 (0.31–2.27)
Air Force	240 (7.4) (4.2–10.5)	0.71 (0.38–1.32)	0.84 (0.40–1.77)
<b>Ever deployed</b>			
No	300 (6.8) (3.8–9.9)	Reference	Reference
Yes	460 (10.6) (7.7–13.6)	1.64 (0.92–2.94)	1.10 (0.57–2.13)
<b>Lifetime sexual trauma category</b>			
No lifetime sexual trauma	200 (3.8) (2.0–5.5)	Reference	Reference
Non–military-related sexual assault only	240 (11.7) (6.4–16.9)	3.51 (1.71–7.19)	2.14 (0.94–4.86)
Military-related sexual assault (± non–military-related sexual assault)	320 (23.5) (15.9–31.2)	7.80 (4.12–14.94)	4.06 (1.62–10.21)
<b>Count of types of lifetime nonsexual trauma, mean (95% CI)</b>			
All respondents	2.95 (2.76–3.15)	1.39 (1.28–1.52)	1.31 (1.17–1.47)
Respondents without any lifetime PTSD	5.98 (5.11–6.84)		
Respondents with any lifetime PTSD	2.66 (2.48–2.85)		

Note: CI = confidence interval, OR = odds ratio, PTSD = posttraumatic stress disorder.  
 \*Binary logistic regression.  
 †Cases representing 2.5% of the population were excluded from the final model because of missing values.  
 ‡Weighted to the entire Canadian Regular Force in service in September 2012. To protect the identity of respondents, Statistics Canada permits the release only of weighted cell counts, which must be rounded to the nearest 20. We calculated prevalence rates using these rounded cell counts.  
 §Except where noted otherwise.  
 ¶Adjusted for age group, marital status, region, rank category, element, deployment history and number of lifetime nonsexual traumatic events.  
 \*\*Not included in final model owing to the lack of an unadjusted association with the outcome.

mental disorders, which may be different from those in women.<sup>21</sup>

## Conclusion

Effective prevention and control of social and public health problems starts with a clear picture of the scope of the problem, the characteristics of those affected by it, the circumstances under which it occurs and its impact on the affected population. This study shows that military-related sexual assault has been reported by a sizeable fraction of Canadian military women, is associated with mental disorders and may be especially likely to occur on deployment. Although the lifetime prevalence of sexual assault among Canadian military personnel appears similar to that among other Canadians, the Canadian military may have special opportunities to address the problem, such as the recent establishment of an independent Sexual Misconduct Response Centre and initiation of prevention research, programs and policies.<sup>22</sup> Priorities for additional research on military-related sexual assault include investigating the precise nature and circumstances of the events (and of the victims at the time of the events), which would provide additional information for prevention and control efforts.

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**Contributors:** Kimberley Watkins wrote and revised most of the manuscript. Rachel Bennett conducted the statistical analyses, prepared the tables and contributed to the writing of the Methods section. Mark Zamorski contributed substantially to the study design and implementation, data analysis and interpretation, and writing and revising the manuscript. Isabelle Richer contributed to the design of the statistical analyses and the writing of the abstract. All of the authors approved the final version to be published and agreed to act as guarantors of the work.

**Funding:** The Department of National Defence provided the authors' salaries and funded the survey development and administration.

**Role of funders:** The investigators developed the study protocol, which was accepted by the study sponsor without modification. The sponsor had no direct role in data collection or analysis. In accordance with Department of National Defence (DND) policy, the paper was reviewed and approved for submission without modification by Defence Research and Development Canada and the Canadian Armed Forces Deputy Surgeon General. No undue influence on the part of DND, the Canadian Armed Forces or the Government of Canada occurred at any part of this research project.

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**Supplemental information:** For reviewer comments and the original submission of this manuscript, please see [www.cmajopen.ca/content/5/2/E496/suppl/DC1](http://www.cmajopen.ca/content/5/2/E496/suppl/DC1)