Association of Child Maltreatment and Deployment-related Traumatic Experiences with Mental Disorders in Active Duty Service Members and Veterans of the Canadian Armed Forces

Association de la Maltraitance des Enfants et des Expériences Traumatisantes Liées au Déploiement Avec les Troubles Mentaux Chez les Membres du Service Actif et Les Anciens Combattants des Forces Armées Canadiennes

Tracie O. Afifi, PhD[1] ⃝, Jitender Sareen, MD[2], Tamara Taillieu, PhD[3] ⃝,
Ashley Stewart-Tufescu, PhD[1], Natalie Mota, PhD[4] ⃝,
Shay-Lee Bolton, PhD[2] ⃝, Gordon J. G. Asmundson, PhD[5],
Murray W. Enns, MD[6] ⃝, Katie A. Ports, PhD[7],
and Rakesh Jetly, OMM, CD, MD, FRCPC[8]

Abstract

Objective: Mental health among military personnel is an important public health priority. It is known that military personnel experience a high prevalence of child maltreatment and deployment-related traumatic events (DRTEs) and both are related to mental health outcomes. However, few, if any, studies have examined the cumulative and interactive effects of child maltreatment and DRTEs on mental health disorders in a sample of active duty service members and military veterans.

Methods: Data were from the Canadian Armed Forces (CAF) Members and Veterans Mental Health Follow-up Survey collected in 2018 ($N = 2,941$, response rate $= 68.7\%$), a 16-year follow-up survey of CAF Regular Force members interviewed in 2002. Five types of child maltreatment and 10 types of DTREs were assessed for impact on mental health. Mental disorders included past 12-month generalized anxiety disorder (GAD), panic disorder, social phobia, and major depressive episode (MDE). Past 12-month symptoms of posttraumatic stress disorder (PTSD) were also examined.

Results: The prevalence of any exposure to child maltreatment and DRTEs was 62.5% and 68.6%, respectively. All types of child maltreatment were associated with increased odds of past 12-month PTSD symptoms and mental disorders with the exception of physical abuse and GAD as well as childhood exposure to intimate partner violence and panic disorder.

[1] Departments of Community Health Sciences and Psychiatry, University of Manitoba, Winnipeg, Canada
[2] Department of Psychiatry, University of Manitoba, Winnipeg, Manitoba, Canada
[3] Department of Community Health Sciences, University of Manitoba, Winnipeg, Manitoba, Canada
[4] Department of Clinical Health Psychology, University of Manitoba, Winnipeg, Manitoba, Canada
[5] Department of Psychology and Anxiety and Illness Behaviours Lab, University of Regina, Regina, Saskatchewan, Canada
[6] Department of Psychiatry, University of Manitoba, Winnipeg, Manitoba, Canada
[7] Department of Defense, Sexual Assault Prevention and Response Office, Alexandria, USA
[8] Canadian Forces Health Services, Department of National Defence, Ottawa, Ontario, Canada

Corresponding Author:
Tracie O. Afifi, PhD, Departments of Community Health Sciences and Psychiatry, University of Manitoba, S113-750 Bannatyne Avenue, Winnipeg, Manitoba, Canada R3E 0W5.
Email: tracie.afifi@umanitoba.ca

Cumulative effects of having experienced both child maltreatment and DRTEs increased the odds of past 12-month PTSD symptoms, GAD, social phobia, and MDE. No interaction effects were significant.

Conclusions: The prevalence of a child maltreatment history is high among active Canadian military and veterans. As well, child maltreatment may increase the likelihood of mental disorders across the life span. This may be especially true for individuals who also experience DRTEs. Understanding these relationships may provide insight into developing effective interventions for military personnel and veteran mental health outcomes.

Abrégé

Objectif : La santé mentale chez les militaires est une importante priorité de santé publique. Il est connu que les militaires connaissent une prévalence élevée de maltraitance des enfants et d'événements traumatisants liés au déploiement (ETLD) qui relèvent tous deux des résultats de santé mentale. Toutefois, peu ou pas d'études ont examiné les effets cumulatifs et interactifs de la maltraitance des enfants et des ETLD sur les troubles de santé mentale dans un échantillon de membres du service actif et d'anciens combattants.

Méthode : Les données provenaient de l'Enquête de suivi sur la santé mentale auprès des membres des Forces armées canadiennes et des ex-militaires (ESSMFACM) mené en 2018 (n = 2 941, taux de réponse = 68,7 %), une enquête de suivi après 16 ans des membres des Forces armées canadiennes (FAC) qui avaient été interviewés en 2002. L'impact de 5 types de maltraitance des enfants et de 10 types d'ETLD a été évalué sur la santé mentale. Les troubles mentaux comprenaient le trouble d'anxiété généralisée (TAG) des derniers 12 mois, le trouble panique, la phobie sociale, et l'épisode dépressif majeur (EDM). Les symptômes des 12 derniers mois du trouble de stress post-traumatique ont aussi été examinés.

Résultats : La prévalence d'une exposition à une maltraitance des enfants et à des ETLD était de 62,5 % et 68,6 %, respectivement. Tous les types de maltraitance des enfants étaient associés à des probabilités accrues de symptômes de TSPT des 12 derniers mois et de troubles mentaux à l'exception de l'abus physique et du TAG de même que l'exposition dans l'enfance à un partenaire de violence intime (PVI) et au trouble panique. Les effets cumulatifs d'avoir connu la maltraitance des enfants et les ETLD augmentaient les probabilités des symptômes du TSPT des 12 derniers mois, du TAG, de la phobie sociale, et de l'EDM. Les effets des interactions n'étaient pas significatifs.

Conclusions : La prévalence des antécédents de maltraitance des enfants est élevée chez les militaires et les anciens combattants canadiens. La maltraitance des enfants peut également accroître la probabilité de troubles mentaux de durée de vie. Cela peut s'avérer particulièrement pour les personnes qui vivent aussi des ETLD. Comprendre ces relations peut donner une idée pour mettre au point des interventions efficaces pour les résultats de santé mentale des militaires et des anciens combattants.

Introduction

The mental health of military personnel and veterans is a major public health concern. Nationally representative data from the Canadian Armed Forces (CAF) indicated that past 12-month mental disorders are prevalent among Regular Force personnel, with 8% having major depression, 5.3% having posttraumatic stress disorder (PTSD), and 4.7% having generalized anxiety disorder (GAD).[1] A large body of research using general population and military samples exists on the relationship between trauma and increased likelihood of mental disorders and suicidal behavior.[1-5] Due to the nature of military work, including experiences during deployment, military personnel compared to the general civilian population are exposed to more traumatic events. Indeed, previous research has found that combat, peacekeeping operations,[6] and deployment-related traumatic events (DRTEs) are associated with increased odds of mental health problems among active duty military personnel.[7,8]

The science connecting childhood experiences and mental health outcomes is robust and consistently demonstrates strong relationships between exposure to childhood adversity and trauma and poorer mental health outcomes, including depression, anxiety, and suicide attempts.[9-13] Previous research has also indicated that a childhood history of abuse (i.e., physical abuse, sexual abuse, and childhood exposure to intimate partner violence [IPV]) among CAF Regular Force personnel was higher compared to aged-matched civilians (47.7% compared to 33%, respectively).[3] Adverse childhood experiences (ACEs), including child maltreatment and household challenges, have also been found to be highly prevalent in veterans from the United States.[14] Similarly, in a PTSD treatment-seeking sample of men who served in the U.S. military, a majority of those in the study had experienced ACEs, and after controlling for deployment-related stressors, ACEs were independently associated with suicidality.[15]

Much is known about the relationship between trauma, both in childhood and in adulthood, and mental health but less is known about the accumulation (i.e., cumulative or additive) of and interaction (i.e., moderation or multiplicative) between child maltreatment history, DRTEs, and mental disorders among military personnel and veterans. It possible that the experiences of child maltreatment and DRTEs may be cumulative, yet it is also possible that early life adversity may be related to heightened likelihood for deployment trauma that moderates or multiplicatively amplifies the risk of poor mental health outcomes beyond additive effects.[16-18] The current literature using representative Canadian and U.S. military samples indicates that a child maltreatment history is associated with increased likelihood of mental disorders[4] and comorbid mental disorders[1] and that there are cumulative effects between childhood adversity and DRTEs on past year mood and anxiety disorders.[5]

In a nationally representative CAF and general population Canadian samples, it was found that all individual types of child abuse including physical abuse, sexual abuse, and exposure to IPV were associated with increased odds of suicidal ideation, plans, and attempts.[3] In addition, among CAF members, cumulative effects between child abuse and DRTEs, but not interaction effects, were found for past-year suicidal ideation and plans. Similar findings were also noted in a Canadian community sample of first responders with regard to child abuse, career-related trauma, and suicidal behaviors.[19] As well, among veterans from Australia, both ACEs and DRTEs were associated with poorer mental health, but ACEs were not found to significantly modify the association between DRTEs and mental health.[20] However, in a study using a nationally representative U.S. veteran sample, 1 significant interaction effect found was between child sexual abuse and combat exposure and suicidal ideation.[16] A significant interaction effect between child maltreatment and DTREs for alcohol problems was also noted in another study using a convenience male sample of U.S. male Army Reservist or National Guard Soldiers.[18] In summary, our understanding of possible cumulative and interaction effects of child maltreatment and DRTEs on mental health outcomes remains limited. More support in the literature has been noted for cumulative effects, with less evidence or inconsistent findings for interactive effects.[3,16,18] An important limitation in this area of research is how childhood adversity and child maltreatment are assessed, which varies greatly across studies. Some studies include some ACEs,[15] some types of child maltreatment,[1,3] or a combination of both.[5,21]

More work specifically focused on child maltreatment and DRTEs and their relationship to mental disorders is needed, as experiencing child maltreatment in addition to DRTEs may have a cumulative or interactive effect on mental disorders among CAF active duty members and veterans. The current study extends knowledge in this area with the inclusion of 5 types of child maltreatment among currently serving CAF personnel and veterans using established assessments along with the assessment of several mental disorders. Understanding these relationships is important to inform prevention efforts and intervention and treatment efforts aimed at reducing poor mental health outcomes among CAF and veterans.

The objectives of the current study were to use the Canadian Armed Forces Members and Veterans Mental Health Follow-up Survey (CAFVMHS, 2018) to: (1) examine the prevalence of 5 child maltreatment types (i.e., physical abuse, sexual abuse, emotional abuse, neglect, and exposure to IPV) among currently serving CAF personnel and veterans; (2) determine the strength of associations between child maltreatment history and mental disorders among currently serving CAF personnel and veterans, and (3) determine whether child maltreatment history has a cumulative and/or interactive effect on the association between DRTEs and mental disorders among CAF personnel and veterans. It is hypothesized that: (1) all 5 child maltreatment types will be highly prevalent with some variation among serving CAF personnel and veterans; (2) child maltreatment history will increase the odds of all mental disorders among currently serving CAF personnel and veterans; and (3) cumulative effects but not interactive effects on the association between child maltreatment and DRTEs on mental disorders among CAF personnel and veterans will be found.

Methods

Data and Sample

In 2002, Statistics Canada conducted the Canadian Community Health Survey—Canadian Forces Supplement (CCHS-CFS) that included a representative sample of 5,155 active duty Regular Forces CAF personnel.[22] The CAFVMHS data were collected in 2018 and is a 16-year follow-up survey of CAF Regular Force members interviewed in 2002. The sampling frame was created using a list of Regular Force respondents from the 2002 CCHS-CFS survey and contact information from Veterans Affairs Canada, Department of National Defence, among others. The Vital Statistics Death Registry was used to identify those who had died. In addition, in 2016, the Life After Service Survey (LASS) and the Canadian Armed Forces Transition and Well-Being Survey (CAFTWS) were conducted by Statistics Canada. To reduce respondent burden, those who participated in the LASS and CAFTWS were considered ineligible for the 2018 CAFVMHS. Respondents were initially contacted with a mailed bilingual introductory letter. Respondents were not compensated.

The CAFVMHS reinterviewed 68.7% of those eligible (i.e., not deceased, still living in one of the 10 Canadian provinces, not interviewed for Statistics Canada's LASS or CAFTWS, and not part of a subset of the population that was randomly selected for exclusion due to budgetary constraints) for the follow-up survey ($N = 2,941$).[23] Thus, the

CAFVMHS includes respondents who are still actively serving as Regular Force CAF personnel ($n = 949$) as well as those who have left the CAF (i.e., veterans) since 2002 ($n = 1,992$). Further methods and attrition details of the CAFVMHS have been published elsewhere.[23,24] Statistics Canada computed longitudinal weights with the purpose of producing estimates that were representative of the original 2002 CCHS-CAF target population using several adjustments including initial sampling weight, identifying out-of-scope units, and redistribution on nonresponse units.[25] Bootstrap weights were also computed for variance estimation.

Measures

Child maltreatment. Child maltreatment included physical abuse, sexual abuse, emotional abuse, neglect, and exposure to IPV that occurred before the age of 16 years (with the exception of one of the neglect items asking about being left alone or unsupervised before the age of 10 years). Physical abuse was measured with 3 items and coded as present if the respondent reported being: (1) slapped on the face, head, or ears, or hit or spanked with something hard (3 or more times); (2) pushed, grabbed, or shoved, or having something thrown at the respondent to hurt them (3 or more times); and/ or (3) kicked, bit, punched, choked, burned, or physically attacked (1 time or more).[26] Sexual abuse was measured as: (1) attempted or forced into unwanted sexual activity by being threatened, held down, or hurt in some way (1 time or more) and/or (2) sexually touched, meaning unwanted sexual touching or grabbing, kissing, or fondling (1 time or more). Emotional abuse was measured with 1 item and coded as present if the respondent reported that a parent or other adult in the home said mean or hurtful things that made the respondent upset or feel really bad about themselves (6 or more times).[26] Neglect was measured as: (1) had to go without things the respondent needed, like food, clothes, shoes, or school supplies (1 time or more) and/or (2) had been left alone or unsupervised before 10 years of age (1 time or more). Exposure to IPV was measured with 1 item and coded as present if the respondent ever saw or heard parents, stepparents, or guardians hitting each other or another adult in the home (3 or more times).[26] A dichotomous any child maltreatment variable (yes or no) was also computed.

Deployment-related traumatic events. Ten dichotomous items (yes or no) were used to assess exposure to DRTEs during a CAF deployment. Respondents who were never deployed were coded as "no" on all of the items. Items included 2 items assessing military sexual trauma (i.e., ever sexually assaulted while on a CAF deployment and ever experienced any unwanted sexual touching while on a CAF deployment) and 8 items assessing exposure to other types of DRTEs (i.e., known someone who was seriously injured or killed; been in a life threatening situation where you were unable to respond due to rules of engagement; ever been injured; seen ill or injured women or children who you were unable to help; received incoming artillery, rocket, or mortar fire; felt responsible for the death of Canadian or ally personnel; ever had a close call, for example, shot or hit but protective gear saved you; had difficulty distinguishing combatants from noncombatants). A dichotomous any DRTE (yes or no) variable was also computed based on whether the respondent reported exposure to one or more of any of the 10 DRTE items assessed in the survey.

Mental disorders. Several mental disorders were assessed using the World Health Organization version of the Composite International Diagnostic Interview (CIDI) based on *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* diagnostic criteria.[27-30] Past 12-month disorders included GAD, panic disorder, social phobia, and major depressive episode (MDE). Presence of past 12-month PTSD symptoms was calculated based on an algorithm of variables available in the data since a past-year diagnosis was not evaluated. This variable was created based on 3 criteria: (1) presence of a CIDI-based PTSD diagnosis in the 16-year follow-up, (2) responding "yes" to a single question that assessed whether the individual had PTSD-related reactions in the past 12 months, and (3) at least 3 of the 7 PTSD symptoms that were assessed in a past-year time frame.

Sociodemographic covariates. Sociodemographic covariates included sex, age, race/ethnicity, total past-year household income, highest level of education, military rank, and current or last military environment.

Statistical Analyses

All data were weighted and bootstrapping was used as a variance estimation technique. First, descriptive statistics were computed to examine the distribution of sociodemographic characteristics by child maltreatment status. Logistic regression was used to examine differences in sociodemographic characteristics by child maltreatment status. Second, the association between child maltreatment and past 12-month mental disorders was examined using logistic regression. Logistic regression models were adjusted for sociodemographic and military covariates. Fourth, a series of multivariable logistic regression models (i.e., all models adjusted for sociodemographic covariates) were run to examine the independent and interactive effects of child maltreatment and DRTEs on past 12-month mental disorders. In Model 1, any child maltreatment was entered (without adjusting for the effects of DRTEs); in Model 2, any DRTE was entered (without adjusting for the effects of child maltreatment); in Model 3, both any child maltreatment and any DRTE were entered into the model simultaneously (to assess the independent effects of child maltreatment and DRTEs on mental disorders); in Model 4, any child maltreatment by any DRTE interaction term was entered into the model (to examine whether child

Table 1. Sociodemographic and Military Covariates by Presence or Absence of Child Maltreatment.

Sociodemographic covariates	No child maltreatment % (95% CI)	Child maltreatment % (95% CI)	OR (95% CI)
Sex			
Male	37.9 (35.8 to 40.0)	62.1 (60.0 to 64.2)	1.00
Female	34.7 (31.5 to 38.0)	65.3 (62.0 to 68.5)	1.15 (0.97 to 1.36)
Age (range in 2018 33 years to 75 years)			
Mean (95% CI)	51.2 (50.7 to 51.7)	51.2 (50.8 to 51.6)	1.00 (0.99 to 1.01)
Race/ethnicity			
White	38.0 (36.1 to 39.9)	62.0 (60.1 to 63.9)	1.00
Non-White	28.3 (20.3 to 37.9)	77.7 (62.1 to 79.7)	1.55 (0.99 to 2.44)
Marital status 2018			
Married/common-law	38.6 (36.4 to 40.8)	61.4 (59.2 to 63.6)	1.00
Single, never married	31.0 (24.2 to 38.7)	69.0 (61.3 to 75.8)	1.40 (0.97 to 2.02)
Widowed, separated, or divorced	32.8 (27.6 to 38.5)	67.2 (61.5 to 72.4)	1.29 (0.98 to 1.68)
Household income 2018			
Less than CDN$50,000	27.4 (20.8 to 35.2)	72.6 (64.8 to 79.2)	1.00
CDN$50,000 to CDN$99,999	36.8 (33.1 to 40.6)	63.2 (59.4 to 66.9)	0.65 (0.43 to 0.99)*
CDN$100,000 to CDN$149,999	39.7 (36.2 to 43.3)	60.3 (56.7 to 63.8)	0.57 (0.39 to 0.85)**
CDN$150,000 or more	37.6 (34.5 to 40.9)	62.4 (59.1 to 65.5)	0.63 (0.42 to 0.94)*
Highest level of education 2018			
Less than high school	36.0 (26.3 to 46.9)	64.0 (53.1 to 73.7)	1.00
High school diploma or equivalent	36.6 (33.4 to 39.8)	63.4 (60.2 to 66.6)	0.97 (0.61 to 1.57)
Some postsecondary (less than a bachelor's degree)	37.0 (33.7 to 40.3)	63.0 (59.7 to 66.3)	0.96 (0.59 to 1.56)
Bachelor's degree or higher	40.3 (36.7 to 44.0)	59.7 (56.0 to 63.3)	0.83 (0.51 to 1.35)
Military rank in 2018			
Junior NCM	39.2 (28.8 to 50.6)	60.8 (49.4 to 71.2)	1.00
Senior NCM	38.9 (34.0 to 44.2)	61.1 (55.8 to 66.0)	1.01 (0.59 to 1.72)
Junior officer	33.9 (24.6 to 44.6)	66.1 (55.4 to 75.4)	1.26 (0.66 to 2.38)
Senior officer	41.3 (35.7 to 47.2)	58.7 (52.8 to 64.3)	0.91 (0.53 to 1.57)
Veteran	36.6 (34.3 to 39.0)	63.4 (61.0 to 65.7)	1.12 (0.68 to 1.83)
Current/last military environment			
Air	41.5 (38.6 to 44.6)	58.5 (55.4 to 61.4)	1.00
Land	36.1 (33.3 to 38.9)	63.9 (61.1 to 66.7)	1.26 (1.06 to 1.50)**
Sea	33.5 (29.2 to 38.0)	66.5 (62.0 to 70.8)	1.41 (1.11 to 1.79)**

Note. CI = confidence interval; NCM = noncommissioned member; OR = odds ratio.
*$P \leq 0.05$. **$P \leq 0.01$

maltreatment and DRTEs had an interactive effect on mental disorders). Fifth, multivariable logistic regression models (i.e., adjusted for sociodemographic and military covariates) were computed to examine the cumulative effects of child maltreatment and DRTEs on past 12-month mental disorders. In these models, child maltreatment and DRTEs were coded into 4 mutually exclusive categories (i.e., no child maltreatment or DRTEs, child maltreatment without DRTEs, DRTEs without child maltreatment, and both child maltreatment and DRTEs).

Results

The prevalence of any child maltreatment history (i.e., physical abuse, sexual abuse, emotional abuse, neglect, and/or exposure to IPV) and DRTEs in the current sample was 62.5% and 68.6%, respectively. Table 1 provides the sociodemographic and military variables for the sample stratified by child maltreatment history. Very few statistically significant differences were noted among those with and without a child maltreatment history. Significant differences were not found for sex, age, marital status, education, and military rank. Significant differences were found for household income and current or last military environment. Table 2 provides the prevalence data for child maltreatment in the whole sample as well as stratified by sex. Sex stratified analyses were only run for the prevalence of child maltreatment and not in the models due to inadequate statistical power. Females were less likely to experience physical abuse and more likely to experience sexual abuse and emotional abuse compared to males. No other statistically significant differences were noted by sex for other types of child maltreatment. Table 3 provides the findings for the relationships between child maltreatment types and PTSD symptoms and mental disorders. All types of child maltreatment significantly increased the odds of past 12-month PTSD symptoms and mental disorders (adjusted odds ratio ranged from 1.48 to 2.63) with 2 exceptions: physical abuse was not associated

Table 2. Prevalence of Child Maltreatment Stratified by Sex.

Child maltreatment	Total % (95% CI)	Males % (95% CI)	Females % (95% CI)	OR (95% CI)[a]
Any physical abuse	44.2 (42.2 to 46.2)	45.0 (42.7 to 47.3)	38.3 (35.3 to 41.4)	0.76 (0.65 to 0.89)***
Slap, hit, spank with object	40.3 (38.4 to 42.3)	41.2 (39.0 to 43.5)	33.7 (30.8 to 36.8)	0.73 (0.62 to 0.85)***
Push, grab, shove, throw	18.6 (17.0 to 20.3)	18.5 (16.7 to 20.4)	19.1 (16.6 to 21.9)	1.04 (0.85 to 1.28)
Kick, bit, punched, choked, burned, attacked	15.6 (14.1 to 17.1)	15.4 (13.8 to 17.2)	16.8 (14.4 to 19.4)	1.11 (0.89 to 1.38)
Any sexual abuse	11.6 (10.4 to 12.8)	8.9 (7.7 to 10.4)	30.5 (27.6 to 33.7)	4.48 (3.58 to 5.61)***
Any emotional abuse	26.9 (25.2 to 28.8)	25.6 (23.6 to 27.6)	36.8 (33.8 to 40.0)	1.70 (1.44 to 2.01)***
Any neglect	33.2 (31.3 to 35.1)	33.5 (31.4 to 35.7)	30.4 (27.7 to 33.3)	0.87 (0.73 to 1.02)
Had to go w/o needed things (food, clothes, etc.)	12.6 (11.3 to 14.1)	12.6 (11.1 to 14.2)	12.8 (10.8 to 15.1)	1.02 (0.80 to 1.30)
Left alone/unsupervised before age 10	28.2 (26.2 to 30.2)	28.6 (26.4 to 30.8)	25.1 (22.5 to 28.0)	0.84 (0.70 to 1.01)
Any exposure to intimate partner violence	11.9 (10.6 to 13.3)	11.7 (10.3 to 13.3)	13.2 (11.2 to 15.5)	1.14 (0.90 to 1.45)
Any child maltreatment	62.5 (60.6 to 64.4)	62.1 (60.0 to 64.2)	65.3 (62.0 to 68.5)	1.14 (0.97 to 1.36)

Note. CI = confidence interval; OR = odds ratio.
[a]Male is the reference category with an odds of 1.00.
***$P \leq 0.001$.

Table 3. Association between Child Maltreatment Types and Past 12 Month PTSD Symptoms and Mental Disorders.

Child maltreatment types	PTSD symptoms	Generalized anxiety disorder	Panic disorder	Social phobia	Major depressive episode
Physical abuse					
AOR (95% CI)	1.87*** (1.36 to 2.58)	1.36 (0.95 to 1.94)	1.49* (1.09 to 2.05)	1.51** (1.15 to 1.98)	1.68*** (1.32 to 2.15)
Sexual abuse					
AOR (95% CI)	2.63*** (1.77 to 3.92)	1.81* (1.08 to 3.02)	1.84** (1.19 to 2.83)	1.99*** (1.34 to 2.93)	2.15*** (1.56 to 2.96)
Emotional abuse					
AOR (95% CI)	2.19*** (1.60 to 3.00)	2.51*** (1.71 to 3.66)	2.01*** (1.49 to 2.73)	2.28*** (1.73 to 3.00)	2.25*** (1.75 to 2.88)
Neglect					
AOR (95% CI)	1.72*** (1.26 to 2.35)	2.07*** (1.44 to 2.99)	1.56** (1.15 to 2.11)	1.59*** (1.20 to 2.10)	1.77*** (1.39 to 2.24)
Exposure to IPV					
AOR (95% CI)	1.74** (1.15 to 2.65)	1.98** (1.23 to 3.17)	1.32 (0.86 to 2.03)	1.86*** (1.28 to 2.70)	2.02*** (1.47 to 2.76)
Any child maltreatment					
AOR (95% CI)	2.00*** (1.40 to 2.84)	1.68** (1.13 to 2.50)	1.45* (1.03 to 2.06)	1.48** (1.12 to 1.94)	1.71*** (1.30 to 2.24)

Note. AOR = adjusted odds ratio (i.e., AORs adjust for sex, age, race, marital status, total household income, highest level of education, military rank, and current/last military environment); CI = confidence interval; IPV = intimate partner violence; PTSD = posttraumatic stress disorder.
*$P \leq 0.05$. **$P \leq 0.01$. ***$P \leq 0.001$

with increased odds of GAD and exposure to IPV was not associated with increased odds of panic disorder.

Table 4 presents the findings for the independent and interactive effects of child maltreatment, DRTEs, and past 12-month PTSD and mental disorders. Child maltreatment and DRTEs were both independently associated with increased odds of PTSD symptoms and all mental disorders when adjusting for sociodemographic and military variables. When further adjusting for child maltreatment and DRTEs in the same model, relationships were attenuated, but all remained significant with the exception that any child maltreatment was not associated with increased odds of panic disorder. Significant interaction effects were not found for any models. Table 5 provides the findings for the cumulative effects of child maltreatment and DRTEs and past 12-month PTSD symptoms and mental disorders. Cumulative effects of having experienced both child maltreatment and DRTEs compared to only child maltreatment or DRTEs alone were noted for PTSD symptoms, GAD, social phobia, and MDE.

Discussion

The aims of the current study were to: (1) examine the prevalence of the 5 child maltreatment types among currently serving CAF personnel and veterans; (2) determine the

Table 4. Independent and Interactive Effects of Child Maltreatment and Deployment-related Trauma and Past 12-Month PTSD Symptoms and Mental Disorders.

	PTSD symptoms	GAD	Panic disorder	Social phobia	Major depressive episode
Adjusted models	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Model 1					
Any child maltreatment	2.00*** (1.40 to 2.84)	1.68** (1.13 to 2.50)	1.45* (1.03 to 2.06)	1.48** (1.12 to 1.94)	1.71*** (1.30 to 2.24)
Model 2					
Any deployment-related traumatic event	3.77*** (2.44 to 5.82)	3.06*** (1.98 to 4.73)	3.75*** (2.44 to 5.76)	2.44*** (1.79 to 3.33)	2.32*** (1.75 to 3.08)
Model 3					
Any child maltreatment	1.94*** (1.36 to 2.78)	1.69** (1.13 to 2.50)	1.40 (0.98 to 2.00)	1.46** (1.11 to 1.93)	1.70*** (1.29 to 2.24)
Any deployment-related traumatic event	3.68*** (2.35 to 5.74)	3.00*** (1.94 to 4.65)	3.73*** (2.41 to 5.75)	2.38*** (1.73 to 3.28)	2.27*** (1.70 to 3.04)
Model 4					
Any child maltreatment interaction with any deployment-related traumatic event	0.15 (0.02 to 1.03)	0.87 (0.35 to 2.20)	0.74 (0.28 to 2.04)	0.80 (0.40 to 1.60)	0.60 (0.33 to 1.07)

Note. AOR = adjusted odds ratio (i.e., AORs adjust for sex, age, race, marital status, total household income, highest level of education, military rank, and current/last military environment); CI = confidence interval; GAD = generalized anxiety disorder; *OR* = odds ratio; PTSD = posttraumatic stress disorder. *$P \leq 0.05$; **$P \leq 0.01$; ***$P \leq 0.001$.

strength of associations between child maltreatment history and mental disorders among currently serving CAF personnel and veterans; and (3) determine whether child maltreatment history has a cumulative and/or interactive effect on the association between DRTEs and mental disorders among CAF personnel and veterans. Novel findings from the current study are as follows.

This is the first study to examine all 5 types of child maltreatment in a CAF sample using established measures. The prevalence of any child maltreatment was 62.5% with the prevalence of all 5 types of child maltreatment ranging from 11.6% (sexual abuse) to 44.2% (physical abuse), which consistent with past research using military and general population samples.[3,7,31] Assessing more types of child maltreatment is a strength of this research but also creates a limitation in that the findings from this work are not comparable to studies using different assessments of child maltreatment. A previous study using a representative CAF cohort indicated that 47.7% of Regular Force personnel reported having a child abuse history, which included physical abuse, sexual abuse, and exposure to IPV.[3] The prevalence of child maltreatment observed in the present study was even higher (62.5%). When including more types of child maltreatment, as is the case in the current study (5 types compared to 3 types), 1 would expect the prevalence to increase. This should not be interpreted as the prevalence of child maltreatment increasing over time,

which cannot be determined with these data. Differences in child maltreatment histories were noted among men and women, with women being more likely to experience sexual abuse and emotional abuse and men being more likely to experience physical abuse. These findings are consistent with previous research using general population data.[2] Unfortunately, we were not able to look at the relationships between individual child maltreatment and specific DTREs and mental health due to inadequate power in the statistical models.

Another novel finding from this work was that all child maltreatment types were associated with past 12-month PTSD symptoms and mental disorders with few exceptions. Overall, these relationships were robust when looking at specific types of child maltreatment with individual mental disorders. In addition, having any child maltreatment history was associated with an increased likelihood of having past 12-month PTSD symptoms, GAD, panic disorder, social phobia, and MDEs. Importantly, the relationships between child maltreatment and mental disorders were attenuated but remained statistically significant, when adjusting for DRTEs with the exception of panic disorder, which became nonsignificant. These findings indicate that the associations between child maltreatment and PTSD symptoms and mental disorders are independent of DRTEs. Although understanding the underlying mechanisms is beyond the scope of this work, these findings highlight the importance of

Table 5. Cumulative Effects of Child Maltreatment and Deployment-related Trauma and Past 12-Month PTSD Symptoms and Mental Disorders.

	No CM and no DRTEs	CM without DRTEs[a]	DRTEs without CM[b]	CM and DRTEs[c]	Differences
PTSD symptoms					
AOR (95% CI)	1.00	10.87* (1.67 to 70.95)	18.27** (2.78 to 119.93)	30.08*** (4.69 to 198.71)	a, b < c
Generalized anxiety disorder					
AOR (95% CI)	1.00	1.88 (0.82 to 4.35)	3.30** (1.53 to 7.11)	5.45*** (2.62 to 11.31)	a, b < c
Panic disorder					
AOR (95% CI)	1.00	1.80 (0.69 to 4.68)	4.55*** (1.86 to 11.12)	6.16*** (2.58 to 14.69)	a < b, c
Social phobia					
AOR (95% CI)	1.00	1.75 (0.94 to 3.26)	2.77*** (1.55 to 4.97)	3.89*** (2.26 to 6.72)	a < b < c
Major depressive episode					
AOR (95% CI)	1.00	2.57*** (1.49 to 4.46)	3.29*** (1.95 to 5.54)	5.05*** (3.04 to 8.39)	a, b < c

Note. AOR = adjusted odds ratio (i.e., AORs adjust for sex, age, race, marital status, total household income, highest level of education, military rank, and current/last military environment); CI = confidence interval; CM = child maltreatment; DRTEs = deployment-related traumatic events; *OR* = odds ratio; PTSD = posttraumatic stress disorder.
*$P \leq 0.05$; **$P \leq 0.01$; ***$P \leq 0.001$.

understanding all trauma across the life span. Future research should investigate the underlying mechanisms related to both exposure to child maltreatment DRTEs and mental health outcomes.

In addition, there were cumulative effects noted between child maltreatment and DRTEs, indicating that having both of these experiences significantly increased the odds of past 12-month PTSD symptoms, GAD, social phobia, and MDE over having either of these exposures alone. These findings of cumulative trauma were similar to another study using a sample of veterans from the United States[32] and consistent with findings that more adversity experiences are related to higher prevalence of psychopathology.[33] What the current study adds is that child maltreatment histories, in addition to DRTEs, are important for understanding the odds of mental disorders. Both child maltreatment and DRTEs have an independent negative association with mental health and having both of these experiences additively increases the odds of having mental disorders. The current study only found that cumulative effects and not interaction effects were significant. This is consistent with previous findings using military and first responder samples examining child maltreatment, DRTE, or career-related trauma and suicidal ideation.[3,19]

Limitations of the current research are as follows. First, child maltreatment was assessed retrospectively in adulthood, which may be subject to recall bias. However, evidence does indicate that retrospective recall of trauma in childhood is valid and reliable in survey data.[34-36] Second, we could only examine any child maltreatment and not individual child maltreatment types in cumulative and interactive models. Second, the data were cross-sectional in nature, which does not allow for inferences regarding causation. Third, these analyses were restricted to 5 mental disorders. Finally, although we were able to include past 12-month PTSD symptoms, we were not able to confirm a past 12-month diagnosis of PTSD with these data.

The current research indicates the importance of gaining a more complete understanding of experiences of trauma, including maltreatment during childhood and traumatic events during deployment, to improve mental health outcomes for military personnel and veterans. From a primary prevention approach, preventing child maltreatment at the societal level may, over time, translate into better mental health outcomes for military personnel. From an intervention perspective, understanding the cumulative effects of child maltreatment and DRTEs may inform mental health treatment strategies. It is important for clinicians to be aware that child maltreatment experiences are associated with mental disorders in later adulthood. Having a comprehensive understanding of trauma history is important. For example, it may be useful for clinicians to understand both child maltreatment and DRTE history and how having both of these experiences may lead to increased odds of poor mental health outcomes. A comprehensive understanding of all experiences that underlie a clinical presentation, including child maltreatment history, are helpful for case conceptualization and treatment planning. Some trauma-focused psychotherapies focus on challenging maladaptive beliefs that emerged following trauma. Some of these beliefs may have developed following child maltreatment and then strengthened with DRTEs. Although our current findings are not able to address the best timing of intervention, clinical intervention that occurs early will likely be advantageous. Further work is needed in this area to determine whether supportive networks and other protective factors may mediate the relationships between child maltreatment, DRTEs, and mental disorders among military personnel and veterans.[33]

Authors' Note

ORCID iD

Tracie O. Afifi, PhD https://orcid.org/0000-0002-3745-9785
Tamara Taillieu, PhD https://orcid.org/0000-0001-5856-8131
Natalie Mota, PhD https://orcid.org/0000-0003-2832-2223
Shay-Lee Bolton, PhD https://orcid.org/0000-0002-0750-4266
Murray W. Enns, MD https://orcid.org/0000-0002-8375-0151

References

1. Richardson JD, Thompson A, King L, et al. Comorbidity patterns of psychiatric conditions in Canadian armed forces personnel. Can J Psychiatry. 2019;64(7):501-510.
2. Afifi TO, MacMillan HL, Boyle M, Taillieu T, Cheung K, Sareen J. Child abuse and mental disorders in Canada. CMAJ. 2014;186(9):E324-E332.
3. Afifi TO, Taillieu T, Zamorski MA, Turner S, Cheung K, Sareen J. Association of child abuse exposure with suicidal ideation, suicide plans, and suicide attempts in military personnel and the general population in Canada. JAMA Psychiatry. 2016;73(3):229-238.
4. Bandoli G, Campbell-Sills L, Kessler RC, et al. Childhood adversity, adult stress, and the risk of major depression or generalized anxiety disorder in US soldiers: a test of the stress sensitization hypothesis. Psychol Med. 2017;47(13):2379-2392.
5. Sareen J, Henriksen CA, Bolton SL, Afifi TO, Stein MB, Asmundson GJ. Adverse childhood experiences in relation to mood and anxiety disorders in a population-based sample of active military personnel. Psychol Med. 2013;43(1):73-84.
6. Sareen J, Cox BJ, Afifi TO, et al. Combat and peacekeeping operations in relation to prevalence of mental disorders and perceived need for mental health care: findings from a large representative sample of military personnel. Arch Gen Psychiatry. 2007;64(7):843-852.
7. Boulos D, Fikretoglu D. Influence of military component and deployment-related experiences on mental disorders among Canadian military personnel who deployed to Afghanistan: a cross-sectional survey. BMJ Open. 2018;8(3):e018735.
8. Searle AK, Van Hooff M, Lawerence-Wood ER, et al. The impact of antecedent trauma exposure and mental health symptoms on the post-deployment mental health of Afghanistan-deployed Australian troops. J Affect Disord. 2017;220:62-71.
9. Afifi TO, Ford D, Gershoff ET, et al. Spanking and adult mental health impairment: The case for the designation of spanking as an adverse childhood experience. Child Abus Negl. 2017;71:24-31.
10. Dube SR, Anda RF, Felitti VJ, Chapman DP, Williamson DF, Giles WH. Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: findings from the adverse childhood experiences study. J Am Med Assoc. 2001;286(24):3089-3096.
11. Felitti VJ, Anda RF, Nordenberd D, et al. Relationship of child abuse and household dysfunction to many of the leading causes of death in adults. Am J Prev Med. 1998;14(4):245-258.
12. Merrick MT, Ports KA, Ford DC, Afifi TO, Gershoff ET, Grogan-Kaylor A. Unpacking the impact of adverse childhood experiences on adult mental health. Child Abus Negl. 2017;69:10-19.
13. Merrick MT, Ford DC, Ports KA, et al. Vital signs: estimated proportion of adult health problems attributable to adverse childhood experiences and implications for prevention - 25 states, 2015-2017. MMWR Morb Mortal Wkly Rep. 2019;68(44):999-1005.
14. Laird CW, Alexander P. Prevalence of adverse childhood experiences among veterans. Clin Soc Work J. 2019;47(4):384-393.
15. Carroll TD, Currier JM, McCormick WH, Drescher KD. Adverse childhood experiences and risk for suicidal behavior in male Iraq and Afghanistan veterans seeking PTSD treatment. Psychol Trauma Theory, Res Pract Policy. 2017;9(5):583-586.
16. Nichter B, Hill M, Norman S, Haller M, Pietrzak RH. Associations of childhood abuse and combat exposure with suicidal ideation and suicide attempt in U.S. military veterans: a nationally representative study. J of Affect Disord. 2020;276:1102-1108.
17. Mclaughlin KA, Conron KJ, Koenen KC, Gilman SE. Childhood adversity, adult stressful life events, and risk of past-year psychiatric disorder: a test of the stress sensitization hypothesis in a population-based sample of adult. Psychol Med. 2010;40(10):1647-1658.
18. Vest BM, Hoopsick RA, Homish DL, Daws RC, Homish GG. Childhood trauma, combat trauma, and substance use in national guard and reserve soldiers. Subst Abus. 2018;39(4):452-460.
19. Turner S, Taillieu T, Carleton RN, Sareen J, Afifi TO. Association between a history of child abuse and suicidal ideation,

plans and attempts among Canadian public safety personnel: a cross-sectional survey. CMAJ Open. 2018;6(4):E463-E470.

20. Zheng WY, Kanesarajah J, Waller M, McGuire AC, Treloar SA, Dobson AJ. Childhood adversity and traumatic exposures during deployment as predictors of mental health in Australian military veterans. Aust NZJ Public Heal. 2016;40(1):10-15.

21. Gaska KA, Kimerling R. Patterns of adverse experiences and health outcomes among women veterans. Am J Prev Med. 2018;55(6):803-811.

22. Statistics Canada. Canadian community health survey cycle 1.2 - mental health and well-being - Canadian forces - master file documentation. 2004. Published 2004 [accessed 2020 Jan 31]. https://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&Id=14189

23. Bolton SL, Afifi TO, Mota N, et al. Predictors of attrition in a 16-year longitudinal follow-up in the Canadian military. Can J Psychiatry. Forthcoming.

24. Afifi TO, Bolton SL, Mota M, et al. Rationale and methodology of the 2018 Canadian armed forces and veterans mental health follow up survey (CAFVMHS): a 16-year follow up survey. Can J Psychiatry. 2020 Dec 2 [Epub ahead of print]. https://doi.org/10.1177/0706743720974837

25. Statistics Canada. Canadian Armed Forces Members and Veterans Mental Health Follow-up Survey 2018. Master File User Guide; Ottawa, ON. 2019.

26. Walsh CA, MacMillan HL, Trocme N, Jamieson E, Boyle MH. Measurement of victimization in adolescence: development and validation of the childhood experiences of violence questionnaire. Child Abus Negl. 2008;32(11):1037-1057.

27. Kessler RC, Ustun BB. The World Mental Health (WMH) survey initiative version of the world health organization (WHO) composite international diagnostic interview (CIDI). Int J Methods Psychiatr Res. 2004;13(2):93-121.

28. World Health Organization. Composite International Diagnostic Interview (CIDI) researcher's manual (Version 1.1, 1994). World Health Organization American Psychiatric Association; 1994.

29. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders: DSM-IV. 4th ed. Washington, DC: American Psychiatric Association; 1994.

30. Kessler RC, Abelson J, Demler O, et al. Clinical calibration of DSM-IV diagnoses in the World mental health (WMH) version of the world health organization (WHO) composite international diagnostic interview (WMH-CIDI). Int J Methods Psychiatr Res. 2004;13(2):122-139.

31. Afifi TO, Mather A, Boman J, et al. Childhood adversity and personality disorders: results from a nationally representative population-based study. J Psychiatr Res. 2011;45(6):814-822.

32. Scoglio AAJ, Shirk SD, Mazure C, et al. It all adds up: addressing the roles of cumulative traumatic experiences on military veterans. Child Abus Negl. 2019;98:104227.

33. McLafferty M, Ross J, Bradley BW, Armour C. Childhood adversities and psychopathology among military veterans in the US: the mediating role of social networks. J Anxiety Disord. 2019;65:47-55.

34. Hardt J, Rutter M. Validity of adult retrospective reports of adverse childhood experiences: review of the evidence. J Child Psychol Psychiatry. 2004;45(2):260-273.

35. Hardt J, Sidor A, Bracko M, Egle UT. Reliability of retrospective assessments of childhood experiences in Germany. J Nerv Ment Dis. 2006;194(9):676-683.

36. Hardt J, Vellaisamy P, Schoon I. Sequelae of prospective versus retrospective reports of adverse childhood experiences. Psychol Rep. 2010;107(2):425-440.