Experiences of loneliness and their relation to perceived social support, family functioning, and mental health among Canadian Veterans

William Younger[a], Kate St Cyr[a], Dominic Gargala[a], Kylie Dempster[a], Natalie Ein[a], Anthony Nazarov[a] and J. Don Richardson[a]

ABSTRACT

Introduction: Veterans are particularly susceptible to heightened levels of social isolation and loneliness. This study aimed to explore the relations between loneliness, perceived social support, and mental health symptoms in Canadian Armed Forces (CAF) Veterans. **Methods:** Data were drawn from a national online survey of Canadian Veterans and Veteran spouses. Self-report measures assessed demographic and service-related factors, loneliness, perceived social support, family functioning, positive mental health, and symptoms of posttraumatic stress disorder (PTSD), depression, anxiety, and moral injury. Because data collection took place during the COVID-19 pandemic, certain context-specific variables were also collected, including exposure to COVID-19 and pandemic-related behavioural changes. Multiple linear regressions were used to construct explanatory models of loneliness. **Results:** Adjusting for other demographic variables, higher levels of loneliness in Veterans were associated with lower perceived social support, difficulties in family functioning, elevated mental health symptoms (i.e., PTSD, depression, and anxiety), less contact outside one's home, and those who were single/unmarried. Conversely, positive mental health was associated with reduced feelings of loneliness. **Discussion:** The degree of loneliness is linked to several mental health, social, and demographic factors, which could serve as key indicators for identifying at-risk individuals or act as focal points for intervention. Implementing strategies that promote positive mental health and foster social connections may offer a promising approach to reducing the impact of loneliness.

Key words: anxiety, CAF, loneliness, PTSD, social support, Veterans

RÉSUMÉ

Introduction : Les vétéran.e.s sont particulièrement susceptibles de vivre un fort degré d'isolement social et de solitude. Cette étude visait à explorer les relations entre la solitude, la perception de soutien social et les symptômes de troubles de santé mentale chez les vétéran.e.s des Forces armées canadiennes (FAC). **Méthodologie :** Les données ont été tirées d'un sondage national en ligne auprès des vétéran.e.s et de leur partenaire. Les mesures d'autoévaluation portaient sur les facteurs démographiques ou reliés au service militaire, la solitude, la perception de soutien social, le fonctionnement familial, la bonne santé mentale, les symptômes de trouble de stress post-traumatique (TSPT), la dépression, l'anxiété et les blessures morales. Puisque la collecte de données a eu lieu pendant la pandémie de COVID-19, certaines variables ont également été recueillies sur le sujet, y compris l'exposition à la COVID-19 et les changements de comportement liés à la pandémie. Des régressions linéaires multiples ont permis de construire des modèles pour expliquer la solitude. **Résultats :** Après correction pour tenir compte des variables démographiques, les plus forts taux de solitude chez les vétéran.e.s étaient reliés à une faible perception de soutien social, à des difficultés avec le fonctionnement familial, à des symptômes marqués de troubles de santé mentale (TSPT, dépression et anxiété), au peu de contacts hors de la maison et au célibat ou au fait de ne pas être marié.e. En revanche, une bonne santé mentale était associée à un moins grand sentiment de solitude. **Discussion :** Le degré de solitude, qui est lié à plusieurs facteurs relatifs à la santé mentale ainsi qu'à des facteurs sociaux et démographiques, pouvait servir d'indicateur clé pour détecter les personnes à risque ou de point focal d'intervention auprès d'elles. La mise en œuvre de stratégies qui favorisent une bonne santé mentale et les relations sociales peuvent constituer une approche prometteuse pour limiter les conséquences de la solitude.

Mots-clés : anxiété, FAC, solitude, soutien social, TSPT, vétéran.es

[a] MacDonald Franklin OSI Research Centre, Lawson Research Institute, London, Ontario, Canada

Correspondence should be addressed to J. Don Richardson at the MacDonald Franklin OSI Research Centre, Finch Mental Health Care Building, 550 Wellington Road, London, Ontario, N6C 4R3, Canada. Email: don.richardson@sjhc.london.on.ca.

LAY SUMMARY

Loneliness can harm mental health and well-being, yet its impact on Canadian Veterans has been unclear. To close that gap, Canadian Armed Forces Veterans were invited to complete an online survey between July 2020 and August 2022. In total, 1,142 Veterans participated. This survey asked them about their experiences of loneliness, social support, and family functioning, as well as the impacts of the COVID-19 pandemic on their lives. Veterans who felt little social support, who had strained family relationships, or who experienced symptoms of posttraumatic stress, depression, moral injury, or anxiety were much more likely to feel lonely. Being single and having fewer contacts outside the home during the pandemic further increased loneliness. These findings show that loneliness among Veterans is closely tied to both social connections and mental health. By screening for loneliness and integrating peer, family, and mental health supports that rebuild social ties, providers and policy makers can help Veterans lead healthier, more connected post-service lives.

INTRODUCTION

Experiences of loneliness and their relation to perceived social support, family functioning, and mental health among Canadian Veterans

Loneliness, social isolation, and social support are all distinct yet interrelated concepts.[1] Social isolation refers to the lack of meaningful social interactions and relationships,[2] while social support is the perceived availability or receipt of emotional, tangible, or alternative forms of help from others.[3] These concepts have contrasting associations with loneliness, which is the psychological distress due to perceived social isolation.[4,5] Specifically, increased perceived social support is associated with reduced loneliness, whereas greater social isolation is related to heightened loneliness.[1] Importantly, loneliness is predominantly influenced by subjective perceptions of social support or isolation, [4] such that one can feel lonely even when they are connected to an extensive social network or, conversely, feel sufficiently connected with just one close friend or partner.[1,4]

Loneliness is increasingly recognized as a widespread concern in many developed countries, including Canada.[6,7] It has been described by Jeste et al.[6] as a modern behavioural epidemic, affecting not just specific populations but society as a whole. The impacts of loneliness are profound and have been linked to a range of negative health outcomes — for example, generalized anxiety disorder (GAD), major depressive disorder (MDD), posttraumatic stress disorder (PTSD), chronic pain, and suicidal ideation.[8,9] These growing concerns are not limited to any single group, but Veterans may be particularly vulnerable to its effects.

Veterans face unique challenges that place them at heightened risk for loneliness, particularly during the military-to-civilian transition (MCT).[5] Previous research has shown that loneliness is commonly reported among samples of Veterans in the United States,[10] the Netherlands,[11] New Zealand,[12] and Iran.[13] Veterans are particularly vulnerable to loneliness due to the disruptions that they may experience within their peer and social networks during this transition.[14,15] In some cases, geographic relocation and the new demands of civilian life can lead to feeling substantially disconnected from previously established social support networks,[15] a situation which may precipitate loneliness.[14,16] Moreover, Veterans are at increased risk of adverse mental health outcomes compared to the general population,[17] including MDD, suicidal ideation, GAD, and PTSD.[8,10,12,18-20] Notably, chronic pain, which is a common comorbidity among Veterans,[21,22] has also been linked to loneliness. Conversely, perceptions of strong social support[10,14,23] and overall psychosocial well-being (e.g., thriving familial, romantic, vocational, and/or platonic social relationships)[8] may serve as protective factors against loneliness in Veterans.

The experience of loneliness among Veterans of the Canadian Armed Forces (CAF) has not been widely explored, and more information is needed in order to better understand the factors associated with loneliness among CAF Veteran so that appropriate measures can be implemented to support the needs of this potentially vulnerable population. As such, this study aimed to explore the association between loneliness, perceived social support, and mental health symptoms among a large sample of CAF Veterans.

METHODS

Study design and data collection

The cross-sectional data for this study are drawn from the baseline data collection of a large longitudinal, web-based, non-probability sampling survey of Canadian Veterans and spouses of Canadian Veterans conducted between July 31, 2020, and August 2, 2022 (for a comprehensive protocol outlining the study methodology, see Forchuk et al.[24]).

Participants

Interested individuals were eligible if they were: 1) 18 years of age or older, 2) residing in Canada, and 3) CAF Veterans or the married/common-law partner of a CAF Veteran at the time of baseline data collection. The analytical frame of the current analysis was restricted to baseline data (collected between July 2020 and February 2021) of Veteran respondents (n = 1,142).

Measures

Loneliness

Participants' experiences of loneliness were measured using the UCLA 3-item Loneliness Scale Short Form (UCLA-LS).[4] Items were scored via a 3-point Likert scale, ranging from 1 (hardly ever) to 3 (often). An example item is the question, "How often do you feel left out?" Higher sum scores indicate greater severities of loneliness, with scores above a cut-off of 6 suggesting significant loneliness.[4]

Social support and family functioning

Participants' perceptions of social support were measured using the 12-item Multidimensional Scale of Perceived Social Support (MSPSS).[23] Items were scored via a 7-point Likert scale, ranging from 1 (very strongly disagree) to 7 (very strongly agree). An example item is the statement, "I can count on my friends when things go wrong." Scores are calculated as the mean of each item response, with higher scores indicating greater perceived social support. Range values for low, medium, and high support were 1 to <3, 3 to <5, and 5 or greater, respectively.[23]

Perceptions of family functioning were assessed via the 12-item McMaster Family Assessment Device General Functioning (FAD-GF) subscale.[25] Items were scored using a 4-point Likert scale, ranging from 1 (strongly agree) to 4 (strongly disagree), with higher mean scores indicating worse family functioning (e.g., "In time of crisis we can turn to each other for support").[26] The cut-off value is 2, such that scores greater than 2 indicate worse family functioning.[25]

Mental health

PTSD, depression, and anxiety symptoms were measured using the PTSD Checklist for DSM-5 (PCL-5),[27] the Patient Health Questionnaire-9 (PHQ-9),[28] and Generalized Anxiety Disorder-7 (GAD-7),[29] respectively. The Moral Injury Outcome Scale (MIOS)[30,31] was used to assess exposure to potentially morally injurious experiences and the severity of moral injury. Cut-off scores used were 33,[27] 10,[32] 10,[29] and 31,[33] respectively. Positive mental health (e.g., feelings of life satisfaction and meaning) was assessed using the Mental Health Continuum-Short Form (MHC-SF).[34,35] Higher total scores indicate higher levels of positive mental health.

COVID-19 exposure, infection, and behaviours

Given that data collection occurred during the early stages of the COVID-19 pandemic, participants were asked about their COVID-19 exposure, infection, and changes in social behaviours (i.e., as a result of imposed restrictions on social gatherings). Derived binary variables captured personal COVID-19 exposure and infection. Participants were also asked about the frequency of leaving their home (e.g., "How much time have you spent going outside of the home [e.g., going to stores, parks, etc.]?") and the frequency of contact with people outside their household compared to pre-pandemic levels.

Socio-demographic and military-related variables

Demographic (e.g., age, gender, living arrangements) and military-related variables (e.g., length of military service, rank, duty) were also collected.

Statistical analyses

Hierarchical multiple linear regression was used to explore associations between loneliness and explanatory variables, including demographic (age, gender, living arrangements [i.e., living alone or not], marital status, municipality size), military (service duration, duty type [regular vs. reserve]), positive mental health, social functioning (perceived social support, family functioning), mental health symptoms (MDD, GAD, PTSD, moral injury severity), and COVID-19-related measures (COVID-19 exposure, COVID-19 infection, changes in interpersonal contact, changes in time spent outside the home). Bivariate analyses were initially performed to calculate crude estimates between loneliness and all included variables. The hierarchical model began with demographic and military-related variables in the base model (Model 1). COVID-19-related variables were added in Model 2, followed by positive mental health and social functioning variables in Model 3. To address multicollinearity concerns between positive mental health and MIOS (see below), two additional models were constructed: Model 4 included all mental health symptom variables except for MIOS, while Model 4.5

replicated Model 4 but replaced positive mental health with MIOS.

The coefficients in the regression output indicated a linear relation between the outcome and predictors. Independence of residuals was assumed given the cross-sectional nature of the study. Normality was assumed via visualization of the distribution of the model output. Further, multicollinearity was assessed using crude estimates calculated via bivariate relations between each predictor and loneliness scores. Measures of positive mental health (i.e., MHC-SF) and moral injury (i.e., MIOS) were identified to have notable degrees of multicollinearity. As a result, these variables were analyzed separately in Models 4 and 4.5. Responses categorized as “other” and “prefer not to say” were excluded from regression analyses but retained in descriptive statistics.

Beta coefficients, standard error statistics, test statistics, and p values for the regression are reported ($\alpha = 0.05$), as well as the regression coefficient, adjusted regression coefficient, change in the regression coefficient, Bayesian information criterion, and Akaike information criterion for each model. R, version 4.2.2 (R Foundation, Vienna, Austria), was used for all analyses.

RESULTS

Sample characteristics

The baseline characteristics of the sample regarding demographics, military characteristics, and COVID-19-related measures are summarized in Table 1. Briefly, the sample predominantly comprised individuals who were men, white, and married or in a common-law relationship. The average age was 55.4 years (SD = 13.1). Veterans served an average of 20.1 years in the military (SD = 11.0), with most serving as Regular Force members in the army. Exposure and infection to COVID-19 were reported by 44.7% and 12.4% of participants, respectively. Descriptives of social functioning and mental health symptoms are present in Table 2. Approximately one-third of participants (32.5%) met the screening criteria for loneliness. While nearly 40% (38.2%) reported high levels of perceived social support, 10.4% reported low support and 31.7% reported medium support. Additionally, 35.8% of participants reported difficulties in family functioning. Regarding mental health symptoms, nearly half of the sample met the screening criteria for probable PTSD (48.9%), MDD (49.6%), and/or GAD (37.8%), while 27.0% of participants screened positive moral injury.

Table 1. Socio-demographic and military characteristics, and COVID-19-related experiences of Veterans included in study sample (n = 1,142)

Variable	Mean (SD)
Age (continuous; years)	55.4 (13.1)
Length of military service (continuous; years)	20.1 (11.0)
Frequency of leaving home during the pandemic	1.7 (1.2)
Frequency of contact with people outside home compared to pre-pandemic levels	-1.4 (1.0)
	n (%)
Age (categorical; years)	
<40	161 (14.4)
40-49	176 (15.8)
50-59	362 (32.4)
60-69	254 (22.7)
≥70	164 (14.7)
Gender	
Men	870 (77.3)
Women	246 (21.9)
Other	5 (0.4)
Prefer not to say	4 (0.4)
Ethnicity	
White	1,051 (92.0)
Indigenous	60 (5.3)
Black	9 (0.8)
Hispanic/Latino	6 (0.5)
Arab	3 (0.3)
Asian	2 (0.2)
South Asian	1 (0.1)
Other	21 (1.8)
Prefer not to say	25 (2.2)
Marital status	
Married/common-law/long-term relationship	877 (77.7)
Single/divorced/separated/widowed	244 (21.6)
Prefer not to answer	7 (0.6)
Living arrangements	
Live with other(s)	950 (83.3)
Live alone	190 (16.7)
Highest level of education	
Less than high school	78 (6.9)
High school diploma	240 (21.3)
Some college/university	331 (29.4)
Completed college/university/professional degree	477 (42.3)
Annual household income	
<$40,000	98 (8.8)
$40,000 to 59,999	197 (17.6)
$60,000 to 79,999	162 (14.5)
$80,000 to 99,999	170 (15.2)

Variable	n (%)
$100,000 to 119,999	137 (12.2)
≥$120,000	220 (19.7)
Do not know	11 (1.0)
Prefer not to say	124 (11.1)
Geographical region	
Central Canada	501 (49.0)
Atlantic Provinces	219 (21.4)
Prairie Provinces/Northern Territories	171 (16.7)
West Coast	131 (12.8)
Municipality size	
Rural area	194 (17.3)
Town/village	260 (23.9)
Small city	268 (23.9)
Suburbs of large city	193 (17.2)
Large city	206 (18.4)
Length of military service (categorical; years)	
<10	252 (22.8)
10 to 19	259 (23.5)
20 to 29	355 (32.2)
≥30	237 (21.5)
Branch of service	
Land	664 (58.5)
Air	271 (23.9)
Sea	181 (15.9)
Other	20 (1.8)
Rank	
Junior non-commissioned member	519 (45.8)
Senior non-commissioned member	396 (34.9)
Junior officer	109 (9.6)
Senior officer	110 (9.7)
Duty	
Regular Force	924 (81.3)
Reserve Force	201 (17.7)
Other	11 (0.97)
COVID-19 exposure	
Yes	454 (44.7)
No	562 (55.3)
COVID-19 infected	
Yes	130 (12.4)
No	920 (87.6)

Notes: Ordinal categories in "frequency of leaving home during the pandemic" were converted to scalar representations ranging from 0 to 4, such that not at all = 0, 1-2 days per week = 1, a few days per week = 2, several days per week = 3, and every day = 4. Ordinal categories in "frequency of contact with people outside home compared to pre-pandemic levels" were converted to scalar representations ranging from -2 to 2, such that a lot less = -2, a little less = -1, about the same = 0, a little more = 1, and a lot more = 2.

Table 2. Mental health and social characteristics of Veterans included in study sample (n = 1,142)

Variable	Total score, Mean (SD)	Proportion meeting screening cut-off, n (%)
UCLA-LS	5.92 (2.19)	371 (32.5)
MSPSS	4.68 (1.37)	–
Low support	–	119 (10.4)
Medium support	–	326 (31.7)
High support	–	436 (38.2)
FAD-GF	2.16 (0.60)	409 (35.8)
PCL-5	31.95 (23.85)	394 (48.9)
PHQ-9	10.45 (8.01)	405 (49.6)
GAD-7	7.94 (6.72)	309 (37.8)
MIOS	23.20 (12.00)	217 (27.0)
MHC-SF	34.52 (17.54)	–

Notes: UCLA-LS = UCLA 3-item Loneliness Scale Short Form; MSPSS = Multidimensional Scale of Perceived Social Support; FAD-GF = McMaster Family Assessment Device General Functioning subscale; PCL-5 = PTSD Checklist for DSM-5; PHQ-9 = Patient Health Questionnaire-9; GAD-7 = Generalized Anxiety Disorder-7; MIOS = Moral Injury Outcome Scale; MHC-SF = Mental Health Continuum-Short Form.

HIERARCHICAL MULTIPLE REGRESSION

The full results of the hierarchical multiple regression and bivariate analyses are described in Table 3. According to bivariate analyses, higher loneliness was associated with older age, living alone, being single, divorced, separated, or widowed, lower positive mental health, lower perceived social support, worse family functioning, and greater MDD, GAD, PTSD, and moral injury symptom severity. Higher loneliness was also reported by those who were exposed or infected with COVID-19 and who experienced reduced time spent outside the home and fewer days spent with others outside the home during the pandemic. Those with a length of service between 10 and 19 years reported higher loneliness, while those with 20 or more years of service reported lower loneliness. Higher loneliness was found among women Veterans compared to men. Municipality size and duty type were not significantly associated with loneliness.

The results indicated that the base model (Model 1), representing demographic and military-related variables, was statistically significant, $F_{15,814} = 14.86$, $p < 0.001$, accounting for 20% of variance (multiple $R^2 = 0.22$, adjusted $R^2 = 0.20$). Age ranges of 50–59 years (β = -0.561, $p = 0.024$), 60–69 years (β = -0.961, $p < 0.001$) and ≥70 years (β = -1.729, $p < 0.001$), as

Table 3. Hierarchical multiple regression models demonstrating associations between participant demographic and mental health factors and experiences of loneliness (n = 1,142)

Predictor	Crude estimates	M1: R^2 = 0.22; AR^2 = 0.20; AIC = 3,487.05; BIC = 3,567.31	M2: R^2 = 0.26; AR^2 = 0.24; ΔR^2 = 0.04; AIC = 3,343.17; BIC = 3,441.60	M3: R^2 = 0.54; AR^2 = 0.52; ΔR^2 = 0.28; AIC = 2,242.37; BIC = 2,347.90	M4: R^2 = 0.57; AR^2 = 0.55; ΔR^2 = 0.03; AIC = 2,097.94; BIC = 2,215.37	M4.5: R^2 = 0.55; AR^2 = 0.52; ΔR^2 = 0.00; AIC = 2,045.93; BIC = 2,162.24
	ß(SE)	ß(SE)	ß(SE)	ß(SE)	ß(SE)	ß(SE)
Intercept		6.164 (0.276)‡	6.063 (0.334)‡	7.803 (0.595)‡	5.824 (0.641)‡	4.212 (0.597)‡
Age (y)	Reference variable = <40					
40 – 49	-0.172 (0.273)	-0.082 (0.270)	-0.111 (0.271)	-0.302 (0.260)	-0.456 (0.257)	-0.569 (0.267)*
50 – 59	-0.731 (0.235)†	-0.561 (0.248)*	-0.511 (0.249)*	-0.264 (0.238)	-0.333 (0.235)	-0.463 (0.245)
60 – 69	-1.30 (0.246)‡	-0.961 (0.267)‡	-0.873 (0.249)†	-0.312 (0.261)	-0.328 (0.258)	-0.503 (0.270)
≥70	-2.203 (0.265)‡	-1.729 (0.285)‡	-1.525 (0.288)‡	-0.536 (0.280)	-0.351 (0.279)	-0.430 (0.270)
Gender	Reference variable = Men					
Women	0.765 (0.176)‡	0.265 (0.172)	0.268 (0.173)	0.391 (0.167)*	0.359 (0.165)*	0.329 (0.175)
Municipal size	Reference variable = Large city					
Suburbs	0.075 (0.247)	0.000 (0.233)	-0.072 (0.232)	-0.268 (0.216)	-0.258 (0.213)	-0.202 (0.223)
Small city	-0.116 (0.230)	-0.017 (0.218)	0.012 (0.217)	-0.027 (0.204)	-0.053 (0.201)	-0.043 (0.213)
Town or village	0.145 (0.229)	0.294 (0.216)	0.259 (0.216)	0.132 (0.203)	-0.016 (0.202)	-0.039 (0.212)
Rural	0.165 (0.241)	0.313 (0.226)	0.334 (0.227)	0.109 (0.212)	-0.055 (0.209)	-0.100 (0.217)
Living alone	Reference variable = No					
Yes	1.311 (0.190)‡	0.109 (0.277)	0.077 (0.273)	-0.154 (0.258)	-0.037 (0.252)	0.060 (0.264)
Marital status	Reference variable = Married, common-law, or long-term relationship					
Single, divorced, separated, or widowed	1.694 (0.167)‡	1.510 (0.252)‡	1.547 (0.249)‡	0.825 (0.239)‡	0.756 (0.233)†	0.659 (0.243)†
Length of service (y)	Reference variable = <10					
10 – 19	0.438 (0.218)*	0.329 (0.209)	0.331 (0.203)	0.356 (0.200)	0.201 (0.195)	0.163 (0.203)
20 – 29	-0.419 (0.196)*	0.039 (0.202)	0.071 (0.203)	0.163 (0.194)	0.170 (0.190)	0.210 (0.200)
≥30	-1.200 (0.214)‡	-0.485 (0.223)*	-0.369 (0.225)	-0.020 (0.211)	0.122 (0.208)	0.067 (0.219)
Duty type	Reference variable = Regular force					
Reserve force	0.144 (0.186)	-1.95 (0.181)	-0.260 (0.181)	-0.009 (0.177)	-0.024 (0.208)	-0.067 (0.183)
COVID-19 exposure	Reference variable = No					
Yes	0.941 (0.146)‡	–	0.561 (0.156)‡	0.348 (0.144)*	0.195 (0.143)	0.216 (0.150)
COVID-19 infected	Reference variable = No					
Yes	0.673 (0.218)†	–	-0.143 (0.225)	-0.111 (0.209)	-0.070 (0.204)	-0.179 (0.215)
COVID-19 changes						
Days outside	-0.340 (0.061)‡	—	-0.232 (0.062)‡	-0.070 (0.060)	-0.058 (0.059)	-0.094 (0.062)
Contact change	-0.180 (0.075)*	—	-0.124 (0.075)	-0.137 (0.073)	-0.162 (0.071)*	-0.197 (0.074)†

(*Continued*)

Table 3. Continued

Predictor	Crude estimates	M1: R^2 = 0.22; AR^2 = 0.20; AIC = 3,487.05; BIC = 3,567.31	M2: R^2 = 0.26; AR^2 = 0.24; ΔR^2 = 0.04; AIC = 3,343.17; BIC = 3,441.60	M3: R^2 = 0.54; AR^2 = 0.52; ΔR^2 = 0.28; AIC = 2,242.37; BIC = 2,347.90	M4: R^2 = 0.57; AR^2 = 0.55; ΔR^2 = 0.03; AIC = 2,097.94; BIC = 2,215.37	M4.5: R^2 = 0.55; AR^2 = 0.52; ΔR^2 = 0.00; AIC = 2,045.93; BIC = 2,162.24
	ß(SE)	ß(SE)	ß(SE)	ß(SE)	ß(SE)	ß(SE)
Social functioning						
MSPSS	-0.828 (0.046)‡	–	–	-0.187 (0.062)†	-0.155 (0.061)*	-0.200 (0.062)†
FAD-GF	1.895 (0.120)‡	–	–	0.342 (0.142)*	0.321 (0.140)*	0.572 (0.142)‡
Positive mental health	-0.086 (0.004)‡	–	–	-0.059 (0.005)‡	-0.031 (0.006)‡	–
Clinical mental health						
PHQ-9	0.182 (0.007)‡	–	–	–	0.036 (0.019)	0.059 (0.019)†
GAD-7	0.201 (0.009)‡	–	–	–	0.038 (0.021)	0.050 (0.022)*
PCL-5	0.059 (0.003)‡	–	–	–	0.011 (0.006)	0.017 (0.007)†
MIOS	0.101 (0.005)‡	–	–	–	–	-0.007 (0.009)

Notes: M1 = Model 1; M2 = Model 2; M3 = Model 3; M4 = Model 4; M4.5 = Model 4.5; Mun. size = municipality size; PCL-5 = PTSD Checklist for DSM-5; PHQ-9 = Patient Health Questionnaire-9; GAD-7 = Generalized Anxiety Disorder-7; MIOS = Moral Injury Outcome Scale; MHC-SF = Mental Health Continuum-Short Form; MSPSS = Multidimensional Scale of Perceived Social Support; FAD-GF = McMaster Family Assessment Device General Functioning subscale; Days outside = days per week spent outside of one's home during the pandemic (vs. before); Contact change = change in contact with others outside of one's home during the pandemic (vs. before).

* p <0.05, † p <0.01, ‡ p <0.001.

well as being single, divorced, separated, or widowed (β = 1.510, p <0.001), and length of service over 30 years (β = -0.485, p = 0.030) were statistically significant predictors of loneliness. In contrast, age ranges of <50 years and 50–59 years, service durations of 10–19 years and 20–29 years, and variables related to gender, municipality size, living arrangements, and duty type were not statistically significant predictors of loneliness.

Model 2, in which COVID-19-related variables were entered into the regression, was statistically significant, $F_{19,782}$ = 14.12, p <0.001, accounting for an additional 4% of variance (multiple R^2 = 0.26, adjusted R^2 = 0.24). Age ranges of 50–59 years (β = -0.511, p = 0.024), 60–69 years (β = -0.873, p <0.001) and ≥70 years (β = -1.525, p <0.001), being single, divorced, separated, or widowed (β = 1.547, p <0.001), exposure to COVID-19 (β = 0.561, p <0.001), and reductions in time spent outside one's house during the pandemic (vs. before; β = -0.232, p <0.001) were all statistically significant predictors of loneliness. In contrast, ages 40–49 years, gender, municipality size, living arrangements, length of service, duty type, COVID-19 infections, and changes in contact with others outside one's house during the pandemic (vs. before) were not statistically significant predictors of loneliness.

Model 3, which included positive mental health and social variables, was statistically significant, $F_{22,577}$ = 30.78, p <0.001, explaining an additional 28% of variance beyond Model 2 (multiple R^2 = 0.54, adjusted R^2 = 0.52). Lower perceived social support (β = -0.187, p = 0.002), worse family functioning (β = 0.342, p = 0.016), lower positive mental health (β = -0.059, p <0.001), being a woman (β = 0.391, p = 0.020), being single, divorced, separated, or widowed (β = 0.825, p <0.001), and exposure to COVID-19 (β = 0.348, p = 0.016) were all statistically significant predictors of loneliness. In contrast, age, municipality size, living arrangements, length of service, duty type, COVID-19 infections, and pandemic-related changes in time spent outside and in contact with others outside the home were not statistically significant predictors of loneliness.

Model 4, which added MDD, GAD, and PTSD symptom severity, was statistically significant, $F_{25,546}$ = 29.40, p <0.001, accounting for an additional 3% of variance beyond Model 3 (multiple $R^2 = 0.57$, adjusted $R^2 = 0.55$). Significant predictors of loneliness included lower perceived social support (β = -0.155, $p = 0.011$), worse family functioning (β = 0.342, $p = 0.022$), poorer positive mental health (β = -0.031, $p < 0.001$), being a woman (β = 0.359, $p = 0.030$), being single, divorced, separated, or widowed (β = 0.756, $p = 0.001$), and having less contact with others outside the home during the pandemic (β = -0.162, $p = 0.020$). In contrast, MDD, GAD, and PTSD symptom severity, age, municipality size, living arrangements, length of service, duty type, COVID-19 exposures, COVID-19 infections, and changes in time spent outside during the pandemic were not statistically significant predictors of loneliness.

Model 4.5 replaced positive mental health with moral injury severity and was also statistically significant, $F_{25,523} = 25.11$, $p < 0.001$, but it accounted for no additional variance beyond Model 3 (multiple $R^2 = 0.55$, adjusted $R^2 = 0.52$). Significant predictors of loneliness included worse family functioning (β = 0.572, $p < 0.001$), lower perceived social support (β = -0.200, $p = 0.001$), greater symptoms of MDD (β = 0.059, $p = 0.002$), GAD (β = 0.050, $p = 0.023$), and PTSD (β = 0.017, $p = 0.009$), and having less contact with others outside one's home (β = -0.197, $p = 0.008$). Age (being 40–49 years; β = -0.569, $p = 0.033$) and marital status (being single, divorced, separated, or widowed; β = 0.695, $p = 0.007$) were also significant demographic predictors of loneliness in this model. In contrast, moral injury, gender, municipality size, living arrangements, length of service, duty type, COVID-19 exposures, COVID-19 infections, and changes in time spent outside of one's home during the pandemic were not statistically significant predictors of loneliness.

DISCUSSION

This study provides important insights into the multi-faceted nature of loneliness among Canadian Armed Forces (CAF) Veterans. This study examined the factors associated with loneliness in a large sample of CAF Veterans and highlighted the importance of relational, psychological, and contextual factors in shaping the experiences of loneliness. The findings align with prior research suggesting that Veterans are particularly vulnerable to loneliness, in part due to difficulties in maintaining and establishing social connections.[14,15,34] The COVID-19 pandemic likely exacerbated these vulnerabilities by introducing physical distancing restrictions and limiting opportunities for social bonding.[37]

Our results emphasize the significance of key relational and psychosocial factors associated with loneliness. Lower perceived social support and poorer family functioning emerged as reliable predictors of heightened loneliness, reinforcing previous research demonstrating their inverse relations with loneliness.[10,14,20,23,38] Additionally, being single, divorced, separated, or widowed was associated with higher loneliness, consistent with previous findings with U.S. Veterans during the pandemic.[8] Social restrictions likely magnified the impact of pre-existing familial difficulties by limiting access to external support systems.[39] For example, Béland et al.[39] found that non-supportive familial relationships before the pandemic could act as a risk factor for loneliness during the pandemic. These data reaffirm the protective capacity of strong, stable relationships and underscore the need to consider relational quality, beyond the mere presence of social ties, when addressing loneliness in Veterans. Strategies that bolster family cohesion, strengthen spousal or partner relationships, and facilitate meaningful social interactions could serve as critical protective measures.

Mental health symptoms, including symptoms of PTSD, MDD, GAD, and moral injury, were strongly linked with loneliness in bivariate analyses, consistent with previous research.[8,10,19,41-42] The results also align with theoretical frameworks such as the Hawkley and Cacioppo's Loneliness Model,[16] which posits that perceived social isolation elicits hyper-vigilance for social threats, thereby generating negative expectations of social interactions. Such cognitive biases can lead to self-fulfilling behaviours that reinforce isolation and exacerbate loneliness.[16,43] Mental health symptoms of depression, PTSD, anxiety, and moral injury may amplify this cycle by encouraging socially avoidant behaviours, heightened self-criticism, and mistrust.[16,44] Although moral injury did not consistently predict loneliness in the final adjusted models, its initial associations with loneliness align with studies showing that shame, guilt, and loss of trust, often central to moral injury,[31] can compromise social connectedness.[41,45] Integrating mental health treatments that directly address the interpersonal consequences of trauma and moral injury may thus be crucial,[46] and therapeutic approaches emphasizing meaning making and re-engagement in social networks could help Veterans restore supportive relationships.[47] Notably, the inconsistent associations observed in adjusted models suggest that the effects of mental health symptoms on loneliness may be contingent on other factors, such as positive mental health, social support, and family functioning, highlighting the need for a holistic, multi-faceted approach to mitigating loneliness.

Positive mental health, characterized by a sense of purpose, satisfaction, and overall flourishing, was consistently associated with decreased loneliness, a finding that was similarly reported by Straus et al.[9] This finding suggests that interventions promoting psychological well-being, such as strength-based therapies or positive psychology interventions,[48] may mitigate loneliness by enhancing Veterans' perceived ability to connect meaningfully with others. Consequently, initiatives that promote personal growth and life satisfaction show promise and warrant further research to establish their efficacy and effectiveness.

The context of the COVID-19 pandemic added another layer of complexity. Pandemic-related variables, such as reduced time spent outside and decreased contact with others, were significant predictors of loneliness. While these findings cannot confirm causality, they highlight how environmental constraints, such as public health restrictions, can exacerbate an already delicate social ecosystem for some Veterans.[18]

The role of gender was inconsistent across models, mirroring mixed findings in the literature[8] and underscoring the need for more nuanced, intersectional research into how loneliness manifests in different demographic sub-groups. Future studies should more closely examine how intersecting factors (e.g., gender, age, ethnic/cultural background) may influence the experience of loneliness among Veterans, providing better insights into how to tailor interventions for diverse sub-populations.

Several limitations warrant consideration. Despite the proportional similarity between the demographic characteristics of our sample and those of the larger CAF Veteran population,[49] the non-probability sampling limits the generalizability of the findings, as the sample may not be fully representative of the larger CAF Veteran population. The sample was relatively homogeneous (predominantly men, white, and those in married or common-law relationships), which constrained the statistical power to explore elements of intersectionality, such as gender and ethnicity Longitudinal analyses are needed to clarify the directionality and stability of these associations over time and to explore whether reducing mental health symptoms or improving family functioning can directly alleviate loneliness. Data collection during the early months of the pandemic may have also amplified the associations observed due to the strict physical distancing restrictions that were in place.

This study highlights the relational, psychological, and contextual factors associated with loneliness in CAF Veterans, with family functioning, social support, and positive mental health emerging as key protective factors. These findings underscore the importance of targeting relational and psychosocial factors in interventions aimed at reducing loneliness. By addressing mental health symptoms and strengthening family and community ties, clinicians, service providers, and policy makers can help ameliorate the harmful impact of loneliness, ultimately supporting a healthier and more socially connected Veteran population. Future longitudinal research can further elucidate these dynamics and refine strategies to help Veterans thrive post-service.

AUTHOR INFORMATION

William Younger, ORCID: 0009–0002-5171-2457, MSc, is a Research Assistant with the MacDonald Franklin OSI Research Centre. He holds a BSc in both biology and psychology from Acadia University and an MSc in psychotherapy from McMaster University. Liam has a keen interest in a variety of topics within clinical psychology and neuroscience and is dedicated to advancing our understanding and the effective application of innovative therapeutic approaches (e.g., ACT, psychedelic-assisted therapies) for trauma-related, mood, and concurrent disorders.

Kate St Cyr, ORCID: 0000–0002-5858-7612, PhD, is an Epidemiologist and part-time Research Associate at the MacDonald Franklin OSI Research Centre. Her work with military personnel and Veterans began at the St. Joseph's OSI Clinic in 2009, where she worked as a Researcher and Program Evaluation Support Officer. Kate's research interests include health service use and determinants of health among military and public safety personnel and Veterans, with a particular focus on sex- and gender-based outcomes.

Dominic Gargala, ORCID: 0000–0002-0531-8240, BSc, joined the MacDonald Franklin OSI Research Centre as a computer science intern in 2020 and has since become a full-time employee. He graduated from Western University with degrees in medical science and biology, as well as computer science. With experience in web application development and a deep interest in data science, machine learning, and AI, Dominic applies his skills to enhance data collection and analysis, driving forward research with innovative technological solutions.

Kylie Dempster, ORCID: 0009–0000-8057-0617, PhD, is the Head of Operations at the MacDonald Franklin OSI Research Centre who holds a PhD in health biosciences from Brock University and brings an established interdisciplinary research background to the team, with application across the lifespan. In her capacity as Head of Operations, Kylie optimizes internal processes, facilitates growth opportunities, and oversees the long-term sustainability of the centre.

Natalie Ein, ORCID: 0000–0002-9581-4183, PhD, is the Head of Research and Implementation at the MacDonald Franklin OSI Research Centre. Dr. Ein oversees the execution of many successful projects and the day-to-day operations of each project to ensure milestones are met and research staff are well supported in their roles. Natalie has extensive research experience, particularly in stress-related intervention research, including methodological reviews, mixed method designs, and psychophysiology.

Anthony Nazarov, ORCID: 0000–0002-3288-7609, PhD, PMP, is a neuroscientist with expertise in psychological resilience and military mental health. Nazarov serves as the Associate Director of the MacDonald Franklin OSI Research and Research Scientist in the Department of Psychiatry at Western University. His work aims to advance the mental health and well-being of military personnel, Veterans, and Veteran families.

J. Don Richardson, ORCID: 0000–0002-2927-6735, MD, is the former Clinical Director of St. Joseph's Operational Stress Injury Clinic and the Scientific Director of the MacDonald Franklin OSI Research. He is one of the foremost experts on military-related posttraumatic stress disorder (PTSD) and has more than three decades of experience in the assessment and treatment of Canadian Armed Forces members and Veterans with PTSD and other OSIs.

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The authors have nothing to disclose.

CONTRIBUTORS

Conceptualization: W Younger, K Dempster, A Nazarov, and JD Richardson

Methodology: K St Cyr, K Dempster, N Ein, and A Nazarov

Formal Analysis: W Younger, D Gargala, and D Du

Investigation: W Younger, K St Cyr, K Demptser, N Raina, and H Nguyen

Resources: A Nazarov and JD Richardson

Data Curation: D Gargala and BD Davis

Writing — Original Draft: W Younger, D Gargala, K Dempster, and A Nazarov

Writing — Review & Editing: W Younger, K Dempster, N Ein, A Nazarov, and A Van Rassel

Visualization: D Gargala and D Du

Supervision: K Dempster, N Ein, A Nazarov, and JD Richardson

Project Administration: K Dempster, A Nazarov, and JD Richardson

Funding Acquisition: A Nazarov and JD Richardson

ETHICS APPROVAL

This study was approved by the Western University Health Sciences Research Ethics Board (115933) and Lawson Research Institute (R-20-293) on July 16, 2020.

INFORMED CONSENT

All participants were provided with a letter of information about the study before completing the survey questionnaires. By commencing the survey, participants provided their implied consent.

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