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ABSTRACT

Background

Compared to the general Canadian population, military members exhibit a higher prevalence of depressive disorders, anxiety disorders, and post-traumatic stress disorder. However, there is a paucity of research investigating the extent to which military members experience positive mental health. Validation of positive mental health measures, including the Mental Health Continuum – Short Form (MHC-SF), is necessary to determine whether well-being can be assessed in a valid and reliable manner among Canadian Armed Forces (CAF) military members. The purpose of this research was to assess the internal consistency reliability, convergent validity, factor structure, and measurement invariance of the MHC-SF among CAF Regular Force and Reserve Force military members.

Data and methods

Data were drawn from the nationally representative 2013 Canadian Forces Mental Health Survey (CFMHS) conducted by Statistics Canada. A random sample of 8,200 CAF military personnel completed the CFMHS, representing 64,400 Regular Force and 4,460 Reserve Force CAF personnel.

Results

As expected, all three MHC-SF subscales (psychological, social, and emotional well-being) correlated positively with life satisfaction, self-rated mental health, sense of belonging, and social support, and correlated negatively with psychological distress and disability due to health conditions. Internal consistency was high. Confirmatory factor analysis supported the three-factor structure of the MHC-SF, and measurement invariance was satisfied.

Interpretation

Findings provided support for the reliability, convergent validity, factorial validity, and measurement invariance of the MHC-SF among both Regular Force and Reserve Force military samples. Therefore, researchers and clinicians can reliably implement the MHC-SF as a tool to assess, interpret, and predict military members' psychological, social, and emotional well-being.

Keywords

Canadian Armed Forces; military; positive mental health; well-being; psychometrics; validation; confirmatory factor analysis; invariance.

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Author note

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What is already known on this subject?

- Past research indicates that military Veterans exhibit a higher prevalence of depression, anxiety and post-traumatic stress disorder compared with the general Canadian population.
- There is a paucity of research investigating the extent to which military members experience positive mental health, including emotional, social, and psychological well-being.
- The validation of measures of well-being, including the Mental Health Continuum-Short Form (MHC-SF), is necessary to determine whether the measures of positive mental health are valid and reliable among CAF members.

What does this study add?

- Our findings support the reliability and validity of the MHC-SF among both Regular Force and Reserve Force military samples.

Traditional definitions conceptualized overall mental and physical health as the absence of disease.^{1, 2} These conventional interpretations of health have since evolved to acknowledge that mental (and physical) health cannot be reduced to the absence of illness, but instead involve a complex interplay of social, psychological and biological factors.³ Specifically, recent definitions describe mental health as a state of well-being in which one copes effectively with everyday stressors, contributes to society, works productively, and realizes one's potential.³ As the promotion of positive mental health becomes an international priority,⁴ it is imperative that researchers, policy makers, and government bodies recognize, understand, and measure positive mental health on a continuum related to, but distinct from, mental illness. This is especially important to enhance the well-being of groups of people who are particularly susceptible to mental health challenges, including military members and Veterans. The purpose of this research is to validate a commonly used measure of positive mental health known as the Mental Health Continuum - Short Form (MHC-SF)^{5, 6} in a nationally representative sample of Canadian Armed Forces (CAF) personnel.

The Mental Health Continuum

Keyes^{7,8} conceptualized positive mental health as a state reflecting subjective perceptions of one's own positive affect and psychological well-being. According to Keyes's⁹ comprehensive dual continua model, mental illness exists on a distinct dimension from mental health, such that one can experience high levels of mental illness (e.g., depression, anxiety) and still present with high levels of mental health (i.e., flourishing). On the other hand, one can exhibit low levels of mental illness, but also demonstrate low levels of mental health (i.e., languishing). This extends beyond a traditional understanding of mental health, such that to increase mental health, one cannot simply strive to reduce instances of mental illness.⁹

The 40-item Mental Health Continuum - Long Form (MHC-LF)⁷ was developed to assess three dimensions of positive mental health based on Keyes's^{7,8} conceptualization of mental health as a construct, including psychological, social, and

emotional well-being. Psychological well-being refers to the dimensions of an individual's positive functioning. Individuals exhibiting high levels of psychological well-being tend to strive for self-acceptance, autonomy, personal growth, positive relationships, and mastery.^{7, 8, 10} Social well-being reflects dimensions of social functioning, including social acceptance, actualization, contribution, coherence, and integration.^{7,8,11} Specifically, those high in social well-being tend to view others with positive regard, see their own activities as valuable to society, find social integration meaningful, and feel a sense of belonging with others.⁸ Both psychological and social well-being are rooted in eudaimonic traditions of study, which equate mental health with positive functioning.^{5, 12} Finally, emotional well-being is defined by positive affective experiences and overall perceptions of life satisfaction.^{7,8} Emotional well-being is traditionally recognized as a component of hedonic well-being, which focuses on maximizing positive feelings (i.e., happiness) while reducing negative feelings to maintain mental health.^{5, 12}

More recently, the 14-item Mental Health Continuum -- Short Form (MHC-SF)^{5, 6} was developed to concisely evaluate levels of psychological, social, and emotional well-being. The MHC-SF was derived from its predecessor, the MHC-LF, by selecting items that were most content-saturated in terms of the definitions for each facet of well-being.⁶ Preliminary validation studies using the MHC-SF have shown that the measure demonstrated strong internal consistency reliability, convergent and discriminant validity, and a three-factor structure among adult samples recruited from South Africa⁵ and the Netherlands,¹³ and among an adolescent sample in the United States.¹⁴ Since its initial development, the MHC-SF has been translated and validated across nations, including Poland,¹⁵ Italy,¹⁶ Brazil,¹⁷ Korea,¹⁸ Canada,¹⁹ and Iran,²⁰ among others. Across all studies, the factor structure was supported and its psychometric properties were sound.

Mental health in the military: The need for valid measurement

Past research has consistently indicated that compared to the general Canadian population, military Veterans exhibit a higher prevalence of depression, anxiety, and post-traumatic stress disorder (PTSD).^{21, 22} In a survey of Regular Force Veterans released between 1998 and 2012, 24% reported that they were diagnosed with a mood disorder, anxiety disorder, or PTSD at the time of survey completion.²³ Other investigations using the Canadian Forces Mental Health Survey (CFMHS) have shown that among CAF personnel, the prevalence of any past-year mood or anxiety disorder increased from 10.9% to 13.6% over an 11-year period.²⁴ It is evident that a multitude of factors, including exposure to combat experiences, morally injurious events,^{25, 26} and service underutilization²⁷ play a role in the development of adverse mental health outcomes among Veterans and military personnel. Although much is known about poor mental health outcomes among Canadian military members, there is a paucity of research investigating the extent to which military members experience positive mental health as defined using the criteria outlined by Keyes.⁹ Given the importance of enhancing military members' health and well-being, it is imperative that initiatives are taken to investigate protective factors associated with enhanced psychological, social, and emotional mental health among military members. However, prior to this, it is necessary to validate the MHC-SF to determine whether this measure of positive mental health is valid and reliable among CAF members, who are particularly at risk of developing symptoms of mental health conditions.

Objective

The purpose of this research is to assess the internal consistency reliability, convergent validity, factor structure, and measurement invariance of the MHC-SF among representative samples of CAF Regular Force and Reserve Force military members. We anticipate that the scale will possess high internal consistency reliability.¹⁹ Based on past findings,¹⁹ we also hypothesize significant positive correlations between the MHC-SF subscales and life satisfaction, self-rated mental health, sense of belonging, and social support. On the other hand, we anticipate significant negative correlations between the MHC-SF subscales and the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0), as well as psychological distress.¹⁹ Following past investigations,^{5, 13, 28} we predict that a three-factor structure will emerge, representing psychological, social, and emotional well-being.

Finally, we will evaluate the measurement invariance of the MHC-SF across Regular Force and Reserve Force CAF members to determine whether the scale measures the same constructs across both groups. We anticipate that the MHC-SF will exhibit measurement invariance across Regular Force and Reserve Force CAF members and that latent mean differences will reveal higher scores on well-being for deployed Reserve Force members than Regular Force members. This hypothesis is based on past research indicating that the prevalence of poor

mental health tends to be higher among Regular Force Veterans than deployed Reserve Force Veterans.^{22, 23}

Method

Participants and procedure

Data were drawn from the cross-sectional, nationally representative CFMHS conducted in 2013.²⁹ The CFMHS was conducted by Statistics Canada, whereby a random sample of 8,200 CAF military members (6,700 Regular Force members; 1,500 Primary Reserve Force members) completed a survey reflecting their mental health, predictors of mental health and use of mental health services.³⁰ Target populations were stratified by rank and deployment to Afghanistan (deployed versus not deployed to Afghanistan).²⁹ Using sampling weights provided by Statistics Canada, the weighted samples represented 64,400 Regular Force and 4,460 Reserve Force CAF personnel. All Reserve Force participants had been deployed to Afghanistan, whereas 60.90% of Regular Force participants were deployed and returned from deployment between 2001 and 2013. Participants provided informed consent, and all ethical approvals were obtained by review boards associated with Statistics Canada. Participant demographic information is provided in Table 1.

Survey respondents completed the CFMHS in person with an interviewer during work hours. Interviews took place in private rooms in the military workplace between April and August 2013. Interviewers were extensively trained to administer the survey questions and to use computer-assisted interviewing procedures.²⁹

Measures

Positive mental health: The primary measure used for this study was the MHC-SF.^{5, 6} The 14-item MHC-SF measures past-month psychological, social, and emotional well-being facets on a 6-point frequency scale ranging from 1 = **every day** to 6 = **never**. Items were rescaled such that scores range from 0 = **never** to 5 = **every day**, and scores were summed such that higher scores represent greater well-being. Past research supports the reliability and validity of the MHC-SF within Canadian samples (e.g., $\alpha = .77$ to $.82$).¹⁹ Although Orpana et al. (2017) reported that correlating residuals for item pairs was necessary to achieve strong model fit, their unmodified three-factor model showed adequate fit to the data. We opted not to correlate residuals for item pairs as these should be used sparingly and with theoretical justification.

Life satisfaction: We assessed life satisfaction with a single item: "Using a scale of 0 to 10 where 0 means 'Very dissatisfied' and 10 means 'Very satisfied,' how do you feel about your life as a whole right now?" This method was successfully applied in a Canadian context to evaluate levels of life satisfaction among the general population.¹⁹

Table 1
Demographic and military information by military membership

Demographics	Regular Force (n=64,400)				Reserve Force (n=4,460)			
	Number	Percentage	95% confidence interval		Number	Percentage	95% confidence interval	
			from	to			from	to
Age								
17 to 24	8,560	13.29	12.38	14.20	400	8.93	7.42	10.44
25 to 34	24,220	37.61	36.44	38.77	1,860	41.52	39.17	43.87
35 to 44	17,860	27.73	26.65	28.81	940	20.98	18.94	23.02
45 to 60	13,760	21.37	20.48	22.25	1,280	28.57	26.45	30.69
Sex								
Male	55,480	86.15	85.30	87.00	4,060	91.03	89.50	92.56
Female	8,920	13.85	13.00	14.70	400	8.97	7.44	10.50
Education								
Secondary or lower	19,160	29.82	28.67	30.97	1,000	22.42	20.27	24.58
Postsecondary or higher	45,100	70.18	69.03	71.33	3,460	77.58	75.42	79.73
Marital status								
Married	29,120	45.26	44.05	46.47	1,880	42.15	39.88	44.42
Common law	13,080	20.33	19.27	21.39	780	17.49	15.47	19.51
Separated/widowed/divorced	4,840	7.52	6.88	8.17	280	6.28	5.00	7.56
Single	17,300	26.89	25.81	27.97	1,520	34.08	31.80	36.36
Language								
English	50,600	78.57	77.53	79.61	3,700	82.96	82.96	84.94
French	13,800	21.43	20.39	22.47	760	17.04	15.06	19.02
Military factors - rank								
Junior NCM	35,440	55.03	54.83	55.24	2,160	48.21	47.50	48.93
Senior NCM	15,500	24.07	23.84	24.30	1,300	29.02	28.30	29.74
Officer	13,460	20.90	20.80	21.00	1,020	22.77	22.55	22.99
Deployed (Afghanistan or outside of North America)	39,220	60.90	59.98	61.82	4,460	100.00

... not applicable

Notes: NCM = non-commissioned member. Reported frequencies are weighted on sample weight and rounded on the base of 20. Percentages are calculated based on weighted frequency after rounding. The 95% confidence intervals are calculated using 500 bootstrapped weights provided by Statistics Canada.

Source: Canadian Forces Mental Health Survey, 2013.

Self-rated mental health: Self-rated mental health was evaluated using a single item: “In general, would you say your mental health is...”, to which participants responded using a scale of 1 = **excellent**, 2 = **very good**, 3 = **good**, 4 = **fair**, and 5 = **poor**. Scores were reversed, such that higher scores indicated higher self-rated mental health. This method was successfully applied in a Canadian context to evaluate levels of self-rated mental health among the general population.^{19, 31}

Sense of belonging: We measured levels of sense of belonging using a single item: “How would you describe your sense of belonging to your local community? Would you say it is...”, to which participants responded using a scale of 1 = **very strong**, 2 = **somewhat strong**, 3 = **somewhat weak**, and 4 = **very weak**. Scores were reversed, such that higher scores indicated a higher sense of belonging. This method was successfully applied in a Canadian context to evaluate the sense of belonging among the general population.¹⁹

Social support: The 10-item Social Provisions Scale (SPS-10)³² was used to assess levels of social support across domains of attachment, guidance, reliable alliance, opportunity for nurturance, social integration, and reassurance of worth. Respondents endorsed items on a 4-point Likert scale ranging from 1 = **strongly disagree** to 4 = **strongly agree**. Responses were summed to create a total social support score. Past research

supports the reliability and validity of the SPS-10 among the Canadian population (e.g., $\alpha = .93$).³³

Psychological distress: Levels of psychological distress were evaluated using the 6-item Kessler Psychological Distress Scale (K6).³⁴ The K6 is a global measure of distress, and items reflect levels of symptoms associated with depression and anxiety over the past month. Respondents endorsed items on a 5-point frequency scale ranging from 1 = **all of the time** to 5 = **none of the time**. Item responses were reverse-scored and summed, such that higher scores indicated higher levels of psychological distress. Past findings support the reliability and validity of the K6 (e.g., $\alpha = .89$).³⁴

Difficulties due to health conditions: The 12-item WHODAS 2.0³⁵ was implemented to measure the extent of difficulties across domains over the past 30 days, including life activities due to health conditions such as disease, illness, injury, mental or emotional problems, or alcohol and drug problems. Respondents endorsed items on a scale ranging from 1 = **none** to 5 = **extreme/cannot do**. Scores were summed to create a total score reflecting disability or difficulties due to health conditions. Past findings support the reliability and validity of the WHODAS 2.0 (e.g., $\alpha = .86$).³⁶

Table 2
Descriptive statistics for all study variables by military membership, military personnel, 2013

Variables/scales	Regular Force				Reserve Force			
	Mean	95% confidence interval		Cronbach's alpha	Mean	95% confidence interval		Cronbach's alpha
		from	to			from	to	
Total MHC	52.70	52.41	52.98	0.90	52.62	52.01	53.24	0.91
MHC Emotional	12.46	12.40	12.51	0.85	12.32	12.18	12.45	0.84
MHC Social	15.80	15.66	15.94	0.81	16.18	15.89	16.47	0.81
MHC Psychological	24.41	24.29	24.52	0.84	24.09	23.82	24.36	0.85
Life satisfaction	7.78	7.74	7.82	...	7.76	7.68	7.84	...
Self-rated mental health	2.62	2.59	2.64	...	2.57	2.52	2.63	...
Sense of belonging	2.50	2.48	2.52	...	2.33	2.29	2.38	...
Social support	36.00	35.90	36.11	0.93	36.28	36.06	36.51	0.93
Psychological distress	3.70	3.61	3.79	0.82	3.67	3.48	3.86	0.84
WHODAS	7.62	7.30	7.93	0.89	6.54	5.97	7.11	0.88

... not applicable

Notes: MHC = Mental Health Continuum. WHODAS = World Health Organization Disability Assessment Schedule 2.0. The 95% confidence intervals are calculated using 500 bootstrapped weights provided by Statistics Canada.

Source: Canadian Forces Mental Health Survey, 2013.

Data analytic strategy

We calculated descriptive statistics, including means, 95% confidence intervals (CIs), skewness, kurtosis, and Cronbach's alphas, as well as bivariate correlations, for all study variables using SAS 9.4 statistical software.³⁷ All analyses were conducted separately across Regular Force and Reserve Force members, and sampling weights were applied across analyses to obtain estimates that are representative of the population. Variance estimates were calculated using 95% CIs derived using 500 bootstrapped weights provided by Statistics Canada.

Dimensionality of the MHC-SF was evaluated using two confirmatory factor analytic (CFA) models representing Regular Force and Reserve Force CAF members in MPlus Version 8.3.³⁸ We used the maximum likelihood robust estimator to account for any non-normality in the data and to estimate less than 0.2% missing data. To assess CFA model fit, we used the chi-square test, root mean square error of approximation (RMSEA), Tucker-Lewis Index (TLI) and comparative fit index (CFI). A non-significant *p*-value from the chi-square test represents good model fit; however, sample size largely influences chi-square values,³⁹ so these should be interpreted in the context of other fit indices. RMSEA values below .05 represent excellent model fit,^{40,41} values between .05 and .08 reflect fair fitting models,⁴⁰ and values above .10 reflect poor fitting models.^{40,41} CFI and TLI values close to .95 represent good model fit.⁴¹ It is, however, important to note that model fit recommendations should serve as a guideline and may not conform to all possible model conditions.^{42, 43}

To assess invariance of the MHC structure across Regular Force and Reserve Force members, we tested a series of multi-group confirmatory factor analytic (MGCFAs) models. First, we evaluated configural invariance to test whether the number of factors was the same across groups. Next, we tested metric invariance to evaluate whether the factor loadings were

equivalent across groups. Finally, we tested scalar invariance to evaluate whether intercepts were equivalent across groups (i.e., when two individuals have the same latent variable score, they should endorse the same item scores). When scalar invariance is satisfied, latent means can be compared across Regular Force and Reserve Force groups. MGCFAs models were compared using chi-square, CFI, and RMSEA difference tests. Invariance is satisfied when CFI and RMSEA difference values are less than or equal to .01 and chi-square difference tests are non-significant.^{44, 45}

Results

Descriptive statistics and bivariate correlations

Descriptive statistics for all study variables across Regular Force and Reserve Force members are displayed in Table 2. Cronbach's alphas were high across all variables, ranging from .82 (psychological distress) to .93 (social support). The MHC total scale and subscales also had strong Cronbach's alphas, ranging from .81 to .91. Skewness and kurtosis values for the MHC total scale and subscales were also within recommended cutoff values (skewness range for Regular Force members = -1.48 to -0.60, kurtosis range for Regular Force members = 0.08 to 5.15; skewness range for Reserve Force members = -1.51 to -0.63, kurtosis range for Reserve Force members = -0.15 to 2.84).

Bivariate correlations between the MHC total scale and its subscales are presented in Table 3. As expected, all MHC subscales and the total score correlated positively with life satisfaction, self-rated mental health, sense of belonging, and social support, with effect sizes ranging from medium to large.⁴⁶ Also consistent with our hypotheses, MHC subscales and the total score correlated negatively with psychological distress and disability due to health conditions with medium-to-large effect

Table 3
Bivariate correlations between Mental Health Continuum subscales and relevant variables by military membership, military personnel, 2013

Variable/scale	Emotional well-being	Social well-being	Psychological well-being	Total score of well-being
Regular Force				
Life satisfaction	0.66	0.43	0.56	0.59
Self-rated mental health	0.60	0.42	0.54	0.57
Sense of belonging	0.28	0.44	0.31	0.41
Social support	0.42	0.38	0.50	0.49
Psychological distress	-0.63	-0.43	-0.56	-0.59
WHODAS	-0.42	-0.32	-0.43	-0.43
Reserve Force				
Life satisfaction	0.68	0.47	0.58	0.62
Self-rated mental health	0.59	0.44	0.53	0.58
Sense of belonging	0.29	0.40	0.32	0.38
Social support	0.46	0.42	0.52	0.52
Psychological distress	-0.63	-0.46	-0.57	-0.60
WHODAS	-0.44	-0.35	-0.45	-0.45

Notes: WHODAS = World Health Organization Disability Assessment Schedule 2.0. Emotional well-being, social well-being, and psychological well-being = Mental Health Continuum subscales. All correlations significant at $p < .001$.

Source: Canadian Forces Mental Health Survey, 2013.

Table 4
Regular Force versus Reserve Force measurement invariance fit indices, military personnel, 2013

Model	χ^2	df	CFI	RMSEA	RMSEA 95% confidence interval	
					From	To
No constraints	1912.59	148	0.939	0.055	0.053	0.057
Metric invariance	1923.58	159	0.939	0.053	0.051	0.055
Scalar invariance	2030.3	170	0.935	0.053	0.051	0.055

Notes: df = degrees of freedom. CFI = comparative fit index. RMSEA = root mean square error of approximation.

Source: Canadian Forces Mental Health Survey, 2013.

sizes.⁴⁶ These correlations provide support for convergent validity of the MHC and were consistent across Regular Force and Reserve Force groups in both direction and magnitude.

Confirmatory factor analyses

When a three-dimensional MHC structure was examined in the Regular Force, model fit was acceptable: $\chi^2_{(74)} = 1,319.73, p < 0.001$; CFI = .942; TLI = .929; RMSEA = .051, 90% CI = .049 to .053. Factor loadings were strong, ranging from .626 (Item 7, Social Well-Being subscale) to .851 (Item 3, Emotional Well-Being subscale). Latent variable correlations were significant, with social and emotional well-being correlated at .668, psychological and emotional well-being correlated at .853, and social and psychological well-being correlated at .782.

The Reserve Force MHC model fit was also acceptable: $\chi^2_{(74)} = 517.75, p < .001$; CFI = .927; TLI = .910; RMSEA = .065, 90% CI = .060 to .070. Factor loadings were strong, ranging from .609 (Item 7, Social Well-Being subscale) to .796 (Item 2, Emotional Well-Being subscale). Latent variable correlations were significant, with social and emotional well-being correlated at .743, psychological and emotional well-being correlated at .904, and social and psychological well-being correlated at .845.

Measurement invariance across Regular Force and Reserve Force members

First, the configural model demonstrated good model fit, indicating that the number of factors was invariant across Regular Force and Reserve Force members (see Table 4). The metric model was also not significantly different from the configural model, $\Delta\chi^2_{(11)} = 10.99, p > .05, \Delta CFI = .000, \Delta RMSEA = .002$, indicating that the factor loadings were invariant across Regular Force and Reserve Force members. Finally, the scalar invariance model fit significantly worse than the metric model according to the chi-square difference test, $\Delta\chi^2_{(11)} = 106.72, p < .01$. However, the χ^2 difference test is influenced by, and often inflated with, large sample sizes.⁴⁷ Thus, we relied on CFI and RMSEA difference tests, which indicated no significant differences between the metric and scalar models: $\Delta CFI = .004, \Delta RMSEA = .000$. This indicates that intercepts were invariant across the two groups and that latent mean differences could be reliably calculated. When latent mean differences were calculated, the Reserve Force group scored significantly lower than the Regular Force group on both emotional and psychological well-being ($\Delta m = -.046, p = .035$ and $\Delta m = -.058, p = .015$, respectively), whereas the Reserve Force group scored significantly higher on social well-being than the Regular Force group ($\Delta m = .087, p = .010$).

To clarify this finding, we followed up with independent samples *t* tests to assess mean differences in MHC well-being subscales between the deployed Reserve Force group and only deployed Regular Force personnel. We found no significant differences between both deployed groups for emotional ($t_{(499)} = 1.33, p = .185$) and psychological well-being ($t_{(499)} = 1.35, p = .176$). The Reserve Force group scored higher than the Regular Force group on social well-being ($t_{(499)} = -2.43, p = .015$).

Discussion

Our findings show that the reliability of the MHC-SF was strong across Regular Force and Reserve Force members, with Cronbach's alphas comparable to or stronger than previous research among general Canadian samples.¹⁹

Convergent validity estimates revealed that the MHC-SF total scale and subscales correlated in expected directions with life satisfaction, self-rated mental health, sense of belonging, social support, psychological distress, and disability due to health conditions. These findings are consistent with research demonstrating that individuals exhibiting strong psychological (e.g., self-acceptance, positive relationships, mastery), social (e.g., meaningful social integration, sense of belonging), and emotional mental health (e.g., positive affective experiences) tend to have overall positive feelings about their life on the whole,^{13, 19} feelings of belonging to their local community,¹⁹ and perceptions of support and reassurance of worth from others.¹⁹ Our findings are also consistent with past research reflecting that military members who endorsed high self-reported psychological, social, and emotional mental health were less likely to experience symptoms of depression and anxiety.⁴⁸ Finally, our results corroborated past findings that Canadians who endorsed high levels of well-being were less likely to report difficulties associated with health conditions such as disease, injury, illness, and drug or alcohol issues.¹⁹

Next, we tested a three-dimensional model (i.e., psychological, social and emotional well-being) of the MHC-SF to confirm the factor structure across Regular Force and Reserve Force military samples. Our findings demonstrated that the three-factor models showed good fit to the data, and this is consistent with past validation studies of the MHC-SF using samples from Canada,¹⁹ South Africa,⁵ the Netherlands,¹³ the United States,⁴⁹ and Poland,¹⁵ among others.

When we evaluated the measurement invariance of the MHC-SF across Regular Force and Reserve Force military members, the configural model fit the data well, indicating that the three-factor structure was consistent across the samples. The metric and scalar models also showed that the factor loadings and intercepts were invariant across the samples. Therefore, we examined mean differences between the Regular Force and Reserve Force groups on latent psychological, social, and emotional well-being. Based on past findings indicating a higher prevalence of mental health conditions among Regular Force Veterans compared with deployed Reserve Force

Veterans,²³ as well as findings reflecting a bivariate association between deployed Regular Force status (versus deployed Reserve Force status) among military personnel and experiencing any post-deployment mental health problem,⁵⁰ we anticipated that the Regular Force members would score lower on latent well-being factors. This hypothesis was partially supported, such that the Reserve Force group scored significantly higher on social well-being than the Regular Force group. This indicates that the Reserve Force members tend to feel a stronger sense of belonging with others and engage in more meaningful social integration than the Regular Force members. This is consistent with past findings indicating that Regular Force Veterans tend to experience higher rates of mood disorders and PTSD than Reserve Force Veterans,^{22, 23} which often result in social withdrawal and difficulty connecting with others.

Interestingly, contrary to hypotheses, the Reserve Force group scored significantly lower on emotional and psychological well-being than the Regular Force group. One potential explanation reflects that while 100% of the Reserve Force members were deployed to Afghanistan in the present sample, 60.90% of the Regular Force members had been deployed at the time of participation in the survey. Deployment events and potentially morally injurious experiences associated with deployment often contribute to the development of mental health conditions, including PTSD and depression.²⁶ Therefore, military members who were deployed (in our case, the Reserve Force sample) are likely at a greater risk of experiencing poor mental health than those who were not deployed. Indeed, when we followed up with independent samples *t* tests assessing deployed personnel only, there were no significant differences between Reserve Force and Regular Force groups in emotional or psychological well-being. These findings further corroborated our speculation that deployment status likely contributed to the Reserve Force group's initial lower scores on well-being.

Limitations and future directions

Despite the strengths of the current study, we acknowledge its limitations. Our sample comprised only those Reserve Force members who had been deployed; therefore, although we would predict that the MHC-SF would be valid among non-deployed Reserve Force members, we cannot generalize our findings to this group. Future research should conduct validity investigations with the MHC-SF among military samples comprising non-deployed Reserve Force members.

Our sample was representative of the Canadian military population. Thus, it comprised mostly men. It is possible that results may not replicate among women or other gender minorities within the military. Future research should investigate the utility of the MHC-SF among women in the military by testing its reliability, factor structure, and gender invariance.

Finally, our findings may not generalize to non-Canadian military samples. Future research should evaluate the reliability

and validity of the MHC-SF among military and Veteran samples outside Canada.

Concluding remarks

Overall, our findings provide support for the reliability and validity of the MHC-SF among both Regular Force and Reserve Force military samples. Therefore, researchers and clinicians can reliably implement the MHC-SF as a tool to assess, interpret, and predict military members' psychological, social and emotional well-being.

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