

# Psychological morbidity, quality of life, and self-rated health in the military personnel

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**Objective:** The mental health of military personnel varies as a result of different cultural, political, and administrative factors. The purpose of this study was to evaluate the psychological morbidity and quality of life of military personnel in Taiwan.

**Materials and methods:** This cross-sectional study utilized the World Health Organization Quality of Life Instrument, brief version, Taiwan version, the General Health Questionnaire-12, Chinese version, and the Visual Analog Scale (VAS) in several military units.

**Results:** More than half of the subjects (55.3%) identified themselves as mentally unhealthy on the General Health Questionnaire-12, Chinese version; however, a higher percentage of officers perceived themselves as healthy (57.4%) than did noncommissioned officers (38.5%) or enlisted men (42.2%). Officers also had higher total quality of life (QOL) scores (83.98) than did enlisted men (79.67). Scores on the VAS also varied: officers: 72.5; noncommissioned officers: 67.7; and enlisted men: 66.3. The VAS and QOL were positively correlated with perceived mental health among these military personnel.

**Conclusion:** Our subjects had higher rates of perceiving themselves as mentally unhealthy compared to the general population. Those of higher rank perceived themselves as having better mental health and QOL. Improving mental health could result in a better QOL in the military. The VAS may be a useful tool for the rapid screening of self-reported mental health, which may be suitable in cases of stressful missions, such as in disaster rescue; however, more studies are needed to determine the optimal cut-off point of this measurement tool.

**Keywords:** military, quality of life, general health scale, Taiwan

## Introduction

Military personnel face multiple stressors in their lives.<sup>1,2</sup> Studies have reported that stress occurs from risky assignments or missions,<sup>3-5</sup> the demand for physical fitness, problems in interactions with peers and those of higher rank,<sup>6</sup> sleep deprivation from shift work,<sup>7,8</sup> deployment and separation from family,<sup>9</sup> and additional noncombat work assignments such as disaster relief, peacekeeping, and other humanitarian actions.<sup>10</sup> Home-front problems with spouses and children also have an impact on the lives of military personnel.<sup>9,11,12</sup> Global defense budget cuts and the downsizing of military manpower increase the workload and stress of the few remaining military personnel.<sup>13-15</sup>

The World Health Organization's (WHO) definition of health includes physical, mental and social aspects.<sup>16</sup> Quality of life (QOL) in the context of individual cultural and subcultural systems is associated with personal goals, expectations, standards and values.<sup>17</sup> The WHO has advocated for the goals of promotion of quality of life, preservation of function and well-being as well as prolongation of peoples' lives.<sup>18</sup>

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The WHO Quality of Life Instrument (WHOQOL) and its brief version (WHOQOL-BREF) are commonly used scales for use among general populations, as well as among disease-specific populations.<sup>19</sup>

The mental and physical health of military personnel may vary as a result of different administrative, characteristic, and political factors.<sup>20</sup> The identification of stressors in military life, as well as the factors that influence health, would enable us to provide proper care for military personnel. Therefore, the relationship between quality of life (QOL) and perceived health are crucial for the maintenance of the welfare of military personnel and troop strength. The aim of this study was to evaluate military personnel from select branches of ground forces in Taiwan for their perceived health status and QOL.

## Materials and methods

### Subjects and clinical assessments

This was a cross-sectional study. Data were collected from basic military units and the Taiwan ground forces units within 1 consecutive year through army, air force, and gendarmeries. There were no differences in ethnicity in this study; all of the participants were Han Chinese in Taiwan.

The researchers contacted each military unit and explained the study to the participants. Inclusion criteria were: 1) membership in one of the military service branches in Taiwan, including mandatory and voluntary entry; 2) the ability to read and write; and 3) agreement that participants' personal information and test results could be used in this research. Personal characteristics of the participants included age, sex, rank, level of education, income, marital status, military service, and mandatory or voluntary enrollment. The packet also included the WHOQOL-BREF, Taiwan version, and the General Health Questionnaire-12 (Chinese version) (CHQ)-12.<sup>16,24</sup> Smoking, alcohol consumption, personal medical conditions, and medical history were also recorded.

Our research team sent out 1,200 questionnaires, of which 900 were returned and, of these, 720 could be used; this led to an effective response rate of 60%.

### Instruments

#### General Health Questionnaire-12, Chinese version (CHQ)-12

The CHQ-12 was based on Goldberg's General Health Questionnaire (GHQ) and translated by Cheng.<sup>16,21</sup> The CHQ-12 reduced the number of questions from 60 to 12,

and it has been used as a screening instrument for anxiety, depression, insomnia, fatigue, social functioning, and family relationships.

The CHQ-12 is a self-reported screening tool. Each question has four possible responses ranging from 0 (not at all), to 3 points (felt much more frequently than usual). Previous research revealed that the CHQ-12 had fair validity and reliability.<sup>16,21–23</sup> For intrinsic validity, Cronbach's alpha coefficient was 0.9 in a community sample and 0.92 in hospital patients; sensitivities were 76% and 77%, respectively.

#### World Health Organization Quality of Life Instrument-BREF, Taiwan version

The WHOQOL-BREF, Taiwan version was translated by Yao et al,<sup>24</sup> and it was determined to be both reliable and valid.<sup>24,25</sup> The Taiwan version added two questions about local culture in addition to the basic 26 questions. This instrument can be used to assess a subject's psychological, physical, social, and environmental conditions over the previous 4 weeks.<sup>25</sup> Internal consistency ranged from 0.70–0.77 for the four domains (physical, psychological, social, and environmental), and the test-retest reliability reached 0.76–0.80 at the domain level. The discriminant validity effectively distinguished healthy from unhealthy people and accounted for 60% of the total QOL.<sup>24</sup>

#### Visual Analog Scale (VAS)

The packet contained part of a self-reported VAS of mental health. The VAS method is widely used to assess the status of a patient's pain or illness.<sup>26,27</sup> It is a cost-effective way to evaluate a patient's health.<sup>28,29</sup> The scores range from 0 (the worst) to 100 (the best), and they indicate subjective health over the previous 2 weeks and before the participants entered military service.

### Statistical analysis

SPSS for Windows version 21.0 (IBM Corporation, Armonk, NY, USA) was used for the statistical analysis. Descriptive results of continuous variables were expressed as mean  $\pm$  standard deviation, and categorical variables were expressed as frequency (%). Group differences were determined by Pearson's chi-square ( $\chi^2$ ) and one-way analysis of variance. One-way analysis of variance was also used to analyze the differences in CHQ and QOL between different ranks, levels of education, groups of mandatory or voluntary military services. Logistic regression was used to estimate odds ratios (ORs) and 95% confidence intervals for the association between the demographic factors, four WHOQOL-BREF

domain scores, and psychological morbidity. Multiple regression analysis was used to identify significant variables associated with CHQ, QOL, and VAS of subjective health condition in the past 2 weeks. All statistical tests were two-tailed, and values of  $P < 0.05$  were considered statistically significant.

## Ethical statement

The protocol for this study conformed to the Declaration of Helsinki. Permission for the study was obtained from the institutional review boards of the Tri-Service General Hospital and the National Defense Medical Center.

## Results

We collected 720 useable questionnaires from service members in the army ( $n=297$ ; 41.3%), air force ( $n=59$ ; 8.2%), gendarme ( $n=197$ ; 27.4%), and other participants ( $n=167$ ; 23.1%). We divided the collected data into three groups according to the subjects' military rank: officers ( $n=162$ ; 31.3%); noncommissioned officers (NCOs) ( $n=104$ ; 20.1%); and enlisted men ( $n=251$ ; 48.5%). None of the enlisted subjects were female, and both the officer (146/14; 91.3%) and the NCO (97/7; 93.3%) groups were predominantly male. The average age of the officers was 30 years, and they were older than the participants in the NCO (25.3 years) and enlisted groups (23.7 years). The officer group had a higher level of education (15.2 years versus 14.3 years for NCOs and 14.1 years for enlisted men).

Most of the officers were volunteers (138/145; 95.4%), as were about half the NCOs (50/104; 49%), but very few of the enlisted men were volunteers (13/215; 5.7%), though they were fulfilling their obligatory military duty. Officers had the longest time in service (11.1 years) compared to NCOs (4.8 years) and enlisted men (1.5 years). The enlisted men have lower average incomes than the NCOs and officers. The average monthly income of officers, NCOs, and enlisted men were New Taiwan Dollars (NTD) 28,700 (US \$956.70), NTD 25,600 (US \$853.30), and NTD 16,100 (US \$536.70), respectively.

There were no significant differences in smoking or drinking alcohol in the three groups, as 34.8% of the officers had a history of smoking and 8.2% drank alcohol more than once per week. The percentages of a history of smoking and drinking alcohol for NCOs and enlisted men were 37.9%/13%, and 35%/10.5%, respectively.

There were 104 participants who reported that they had ongoing medical problems, including allergies ( $n=24$ ), skin rash or itching ( $n=26$ ), common cold symptoms ( $n=18$ ),

musculoskeletal discomfort (strain or sprain:  $n=55$ ; self-reported herniated intervertebral disc:  $n=6$ ; muscle pain:  $n=12$ ), hepatitis B virus carrier ( $n=3$ ), peptic ulcer ( $n=1$ ), hypertension ( $n=2$ ), and type 2 diabetes mellitus ( $n=1$ ). The distribution of illness symptoms was not influenced by rank.

The officers had a higher score on the VAS of self-reported health (72.5) than did the NCOs (67.7) or enlisted men (66.3) ( $P < 0.001$ ), but only for the previous 2 weeks. The VAS score for self-reported health before they entered military service showed no significant differences in the three groups (officers: 74.6; NCOs: 71.0; enlisted men: 72.0). The NCOs and enlisted men felt their health had significantly worsened in recent times when compared to the time that passed before they became enlisted (the average number of years enlisted for officers, NCOs, and enlisted men were  $11.1 \pm 7.3$  years,  $4.8 \pm 5.7$  years, and  $1.5 \pm 2.4$  years, respectively).

As shown in Table 1, officers had lower CHQ scores (9.62) than did NCOs (11.07) and enlisted men (11.51). When we used a score of 9 as the cut-off point (set as the three-quarter cut-off point),<sup>22</sup> and considered subjects reporting 10 or more points as unhealthy CHQ cases or as cases where there was psychological morbidity, the officers had a higher percentage of good health (57.4%) than did the NCOs (38.5%) or enlisted men (42.2%).

The officers also had higher total QOL scores (83.98) than did NCOs (80.64) or enlisted men (79.67). When comparing the four domains of the QOL, officers still had significantly higher scores in each domain than did the enlisted men. NCOs had significantly lower scores than officers in the physical and environmental domains (Table 1 and Figure 1). The QOL showed borderline differences in the different income statuses, but income had no significant influence after adjusting by regression.

Items 1, 3, 4, 5, and 9 on the CHQ showed significant differences among the three groups. On item 1 (headache) and item 5 (poor sleep quality), NCOs' scores of 2.06 and 2.52, respectively, were higher than those of officers' scores of 1.72 and 2.04, respectively. On item 4 (limb tremor or numbness) and item 5 (poor sleep quality), the enlisted men's scores of 1.62 and 2.48, respectively, were higher than those of officers' scores of 1.43 and 2.04, respectively. (Table 2).

At the cutoff point of a CHQ score of 9, officers felt that they had better health ( $\beta$ -value:  $-0.162$ ; OR: 0.542), as compared to the enlisted men. Other significant data showed that older personnel had better health ( $\beta$ -value:  $-0.0033$ ; OR: 0.967), and smokers accounted for more psychological morbidity in higher CHQ scores ( $\beta$ -value: 0.377; OR: 1.458) (Table 3). VAS scores for self-reported health also revealed

**Table 1** Comparison of demographic factors, CHQ scores, and QOL scores by military rank (officer, NCO, enlisted men)

	Officer Number (%) or mean $\pm$ SD	NCO Number (%) or mean $\pm$ SD	Enlisted men Number (%) or mean $\pm$ SD	P-value	Scheffe post hoc
Sex					
Male	146 (91.3)	97 (93.3)	248 (100)	<0.001*	A, C
Female	14 (8.8)	7 (6.7)	0 (0)		
Age (years)	30.0 $\pm$ 6.2	25.3 $\pm$ 3.9	23.7 $\pm$ 2.75	<0.001*	A, B, C
Military service					
Army	121 (79.6)	48 (46.6)	112 (48.3)	<0.001*	A, B
Air force	7 (4.6)	1 (1.0)	5 (2.2)		
Gendarme	24 (15.8)	54 (52.4)	115 (49.6)		
Service type					
Volunteer	145 (95.4)	50 (49)	13 (5.7)	<0.001*	A, B, C
Mandatory	7 (4.6)	52 (51)	215 (94.3)		
Education (years)	15.2 $\pm$ 2.9	14.3 $\pm$ 3.0	14.1 $\pm$ 3.2	0.04*	A
Service years	11.1 $\pm$ 7.3	4.8 $\pm$ 5.7	1.5 $\pm$ 2.4	<0.001*	A, B, C
Smoking history					
Yes	54 (34.8)	39 (37.9)	84 (35)	0.858	
No	101 (65.2)	64 (62.1)	156 (65)		
Alcohol use					
Yes	13 (8.2)	13 (13)	25 (10.5)	0.465	
No	145 (91.8)	87 (87)	212 (89.5)		
VAS					
Now	72.5 $\pm$ 13.1	67.7 $\pm$ 13.6	66.3 $\pm$ 14.1	<0.001*	A, B
Before service	74.6 $\pm$ 12.6	71.0 $\pm$ 16.8	72.0 $\pm$ 13.7	0.079	
Total CHQ score	9.62 $\pm$ 5.61	11.07 $\pm$ 5.48	11.51 $\pm$ 5.96	0.005*	A
Cut-off point 9					
$\leq$ 9	93 (57.4)	40 (38.5)	106 (42.2)	0.002*	A, B
$\geq$ 10	69 (42.6)	64 (61.5)	145 (57.8)		
QOL score	83.98 $\pm$ 12.2	80.64 $\pm$ 10.8	79.67 $\pm$ 11.1	0.001*	
Physical	12.16 $\pm$ 1.9	11.46 $\pm$ 1.8	11.23 $\pm$ 1.8	<0.001*	A, B
Psychological	13.16 $\pm$ 1.9	12.98 $\pm$ 1.8	12.56 $\pm$ 2.1	0.009*	B
Social	13.89 $\pm$ 2.3	13.28 $\pm$ 2.4	13.09 $\pm$ 2.3	0.003*	B
Environmental	12.96 $\pm$ 2.3	12.26 $\pm$ 2.1	12.23 $\pm$ 2.2	0.009*	A, B

**Notes:** A: Statistically significant comparison of officers and enlisted men. B: Statistically significant comparison of officers and NCOs. C: Statistically significant comparison of NCOs and enlisted men. \*Statistically significant difference.

**Abbreviations:** CHQ, General Health Questionnaire-12, Chinese version; QOL, quality of life; NCO, noncommissioned officer; SD, standard deviation; VAS, Visual Analog Scale.

significant differences between the CHQ cases and the non-CHQ cases. The participants experiencing one or more physical symptoms accounted for more CHQ cases ( $\beta$ -value: 1.196; OR: 27.609).

The social and environmental domains on the QOL were significantly associated with lower CHQ case rates ( $\beta$ -values:  $-0.133$  and  $-0.287$ ; ORs: 6.944 and 25.905) (Table 3).

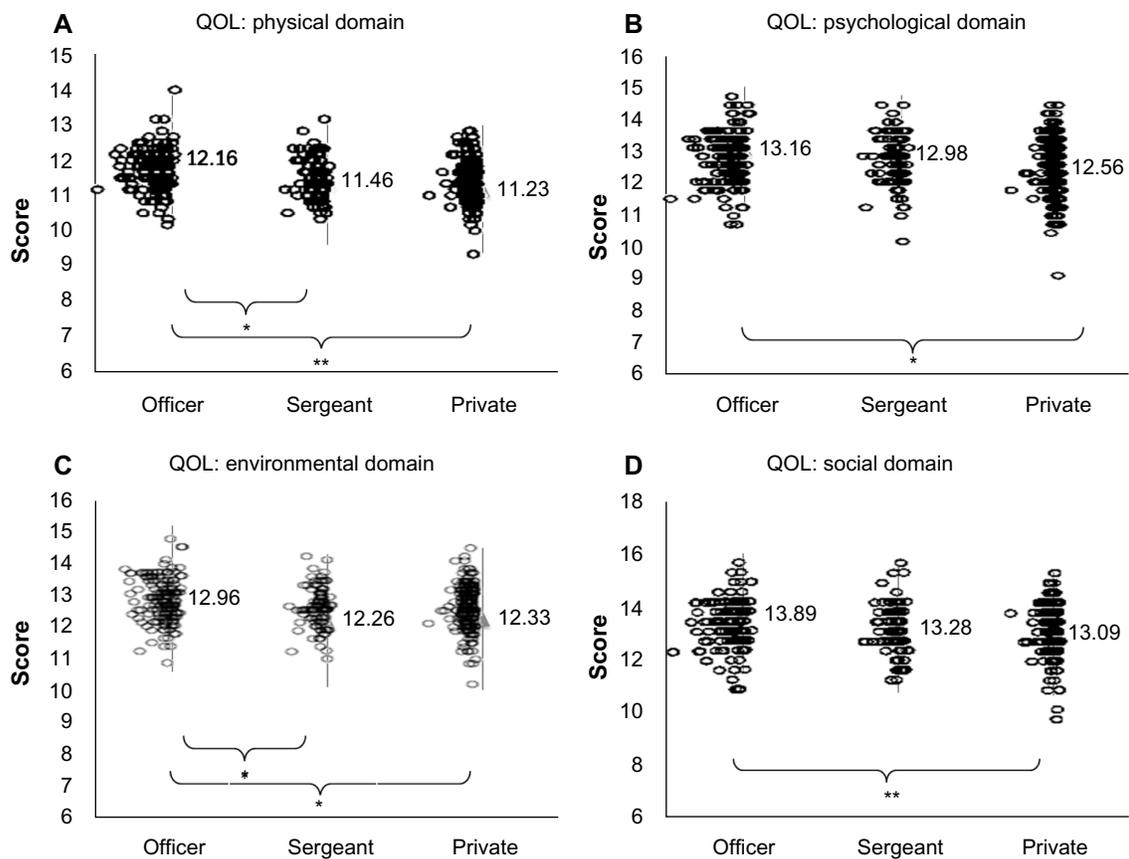
For relationships between the QOL domains, VAS scores of self-reported health, and CHQ scores, we adjusted all the risk factors. As shown in Table 4, only military rank and ongoing physical illness showed a significant relationship.

## Discussion

In this cross-sectional study, the QOL and CHQ scores, and their interactions, were analyzed in different military

branches, ranks, and service types (voluntary or obligatory enlisted personnel). A total of 55.3% of all these subjects reported themselves as being unhealthy on the CHQ; this was higher than in the general population, as rates of 18%–33% were reported in different samples.<sup>30–34</sup> Among our subjects, the NCOs and enlisted men rated themselves as having poor health (61.5% and 57.8%, respectively). This result was similar to that of a previous report in the UK.<sup>35</sup>

In previous studies, for military personnel either in training, combat, or peacekeeping missions, the GHQ case rates were 19.5%–48%, higher than those found in studies of general populations.<sup>36–40</sup> In one previous study performed in a military hospital,<sup>41</sup> the GHQ case rates were 22%–32% for physicians, nurses, and other staff. This difference may reflect the different tools used and the different nature of



**Figure 1** Comparison of the WHOQOL-BREF domain scores by rank.

**Notes:** QOL: quality of life; WHOQOL-BREF, World Health Organization Quality of Life Instrument, brief version.

**Abbreviations:** QOL, quality of life; WHOQOL-BREF, World Health Organization Quality of Life Instrument, brief version.

stress for people who work for the hospital and for troops. In the present study, 55.3% of all the military subjects were CHQ cases; this rate was higher than the rates found in the militaries of other countries, and higher than that in our general population, or that found in other professions.<sup>33,41</sup>

Among the different ranks, the CHQ case rate was 61% for NCOs, and this rate was higher than that of the other two groups. The CHQ case rate for obligatory service members was 58.9%, and this was higher than that for volunteers (48.9%).

**Table 2** CHQ item scores: comparison by rank (officer, NCO, enlisted men)

	Officer	NCO	Enlisted men	F	P-value	Scheffe post hoc
	Mean ± SD	Mean ± SD	Mean ± SD			
1. Been suffering from headaches or pressure in your head	1.72±0.90	2.06±0.80	1.93±0.87	5.28	0.005*	A
2. Had palpitations and worried that you might have heart trouble	1.54±0.72	1.52±0.75	1.61±0.76	0.75	0.472	
3. Had discomfort or a feeling of pressure in your chest	1.50±0.69	1.68±0.85	1.69±0.81	3.25	0.039*	B
4. Been suffering from shaking or numbness of your limbs	1.43±0.62	1.59±0.77	1.62±0.80	3.41	0.034*	B
5. Lost much sleep through worry	2.04±0.93	2.52±0.95	2.48±0.95	13.08	<0.001*	A, B
6. Been taking things hard	2.04±0.88	2.25±0.79	2.16±0.85	2.16	0.116	
7. Been getting along well with your family or friends	2.38±0.90	2.38±0.83	2.49±0.90	0.99	0.369	
8. Been losing confidence in yourself	1.70±0.78	1.75±0.77	1.83±0.83	1.34	0.260	
9. Been feeling nervous and strung-up all the time	1.61±0.72	1.80±0.79	1.80±0.85	3.08	0.047*	
10. Been feeling hopeful about your future	2.27±0.87	2.73±0.79	2.35±0.88	2.42	0.900	
11. Been worried about your family or close friends	1.85±0.78	1.94±0.79	1.92±0.83	0.53	0.587	
12. Felt that life is entirely hopeless	1.55±0.72	1.45±0.65	1.61±0.83	1.59	0.206	

**Notes:** A: Statistically significant comparison of officers and NCOs; B: Statistically significant comparison of officers and enlisted men. \*Statistically significant difference.

**Abbreviations:** CHQ, General Health Questionnaire-12, Chinese version; NCO, noncommissioned officer; SD, standard deviation.

**Table 3** Comparison of the demographic factors and WHOQOL domain scores by psychological morbidity

	CHQ score $\geq 10$	CHQ score $\leq 9$	$\beta$	P-value	Odds ratio	95% CI for experiment B	
	Number (%) or mean $\pm$ SD	Number (%) or mean $\pm$ SD				Lower	Upper
<b>Rank</b>							
Officer	69 (42.6)	93 (57.4)	-0.612	0.003*	0.542	0.364	0.809
NCO	64 (61.5)	40 (38.5)	0.157	0.511	1.170	0.733	1.867
Enlisted	145 (57.8)	106 (42.2)					
<b>Service</b>							
Army	155 (52.2)	142 (47.8)	-0.004	0.983	0.001	0.695	1.429
Air force	39 (66.1)	20 (33.9)	0.576	0.063	3.461	0.970	3.266
Gendarme	103 (52.3)	94 (47.7)					
<b>Service type</b>							
Volunteer	129 (48.9)	135 (51.1)	-0.389	0.024*	5.090	0.483	0.950
Mandatory	165 (58.5)	117 (41.5)					
<b>Sex</b>							
Male	378 (56.2)	295 (43.8)	0.322	0.412	1.38	0.639	2.981
Female	13 (48.1)	14 (51.9)					
<b>Age</b>							
Age	24.86 $\pm$ 5.0	25.68 $\pm$ 4.8	-0.033	0.035*	0.967	0.938	0.998
<b>Education (years)</b>							
Education (years)	13.87 $\pm$ 3.5	14.14 $\pm$ 3.2	-0.023	0.317	0.977	0.934	1.022
<b>Income (NT, K)</b>							
Income (NT, K)	21.3 $\pm$ 23.6	22.5 $\pm$ 26.4	0.020	0.517	0.420	0.961	1.082
<b>Physical illness</b>							
Physical illness	29 (22.8)	98 (77.2)	1.196	<0.001*	27.609	2.117	5.168
<b>Alcohol use</b>							
Alcohol use	379 (55.6)	303 (44.4)	-0.117	0.059	3.573	0.788	1.004
<b>Smoking</b>							
Smoking	90 (38.5)	144 (61.5)	0.377	0.022*	1.458	1.057	2.011
<b>VAS score (now)</b>							
VAS score (now)	64.09 $\pm$ 14.43	73.43 $\pm$ 11.11	-0.061	<0.001*	72.023	0.928	0.954
<b>QOL</b>							
Physical	11.04 $\pm$ 1.87	12.04 $\pm$ 1.84	-0.035	0.539	0.377	0.863	1.080
Psychological	12.24 $\pm$ 2.05	13.28 $\pm$ 1.90	0.013	0.814	0.055	0.907	1.132
Social	12.58 $\pm$ 2.42	14.06 $\pm$ 2.09	-0.133	0.008*	6.944	0.793	0.967
Environmental	11.62 $\pm$ 2.26	13.30 $\pm$ 1.97	-0.287	<0.001*	25.905	0.672	0.838

**Note:** \*Statistically significant difference.

**Abbreviations:** WHOQOL, World Health Organization Quality of Life Instrument; CHQ, General Health Questionnaire-12, Chinese version; N, number; CI, confidence interval; NCO, noncommissioned officer; NT, New Taiwan dollars; K, thousands; VAS, Visual Analog Scale; QOL, quality of life.

In Table 5, we have reviewed several previously selected studies conducted among different military and nonmilitary populations. In mobilized military personnel, the nature of military stress, rather than age or other demographic data (for example, combat-related deployments, peacekeeping or disaster relief actions, or outbreaks of infectious diseases),<sup>35,41-47</sup> is most likely to be related to psychological morbidity and poor quality of life. In the peace time contrarily<sup>41</sup> and among the general population,<sup>48,49</sup> age may play a role in contributing to psychological morbidity and poor QOL in one study that was conducted from a military hospital, in two other studies conducted in the general population.<sup>41</sup> In previous studies conducted among students,<sup>50-52</sup> which had a similar age distribution as that of the present study, the GHQ rates varied from 29%–52% and were higher in the female sex, among subjects experiencing stressful events, those with a basic level of training, those with academic problems, and family social economic status. However, these studies,

including the present one, varied greatly in the number of participants, other demographic data, countries, and stress nature in the target population. Furthermore, the present study is a cross-sectional study; the associations between the demographic factors and psychological morbidity or QOL are hard to compare with other studies.

Some research has shown that the GHQ was better at screening for minor psychiatric morbidity such as depression.<sup>53,54</sup> In the military, psychological factors, as well as social and environmental problems could be risk factors for suicidal ideations.<sup>55</sup> Higher case rates require more attention.

In a previous study,<sup>56</sup> age may have been an independent risk factor for poor psychological health; however, in the present study, age was slightly negatively related to CHQ scores and, after adjustment by multiple regression analysis for rank, the influence of age on CHQ disappeared. The reason may be that those with higher ranks in the military are often older than

**Table 4** Multiple regression analysis of factors for CHQ, QOL, and VAS of health

	Regression coefficient	SE	95% CI for regression coefficient		P-value
			Lower	Upper	
<b>Total CHQ score</b>					
Constant	14.78	2.37	10.121	19.440	<0.001
Rank	-0.87	0.38	-1.621	-0.111	0.025*
Age	-0.09	0.10	-0.295	0.112	0.376
Sex	-0.51	0.46	-1.422	0.394	0.266
Education	-0.04	0.09	-0.214	0.140	0.678
Service	-0.09	0.07	-0.229	0.047	0.196
Years of service	0.09	0.08	-0.080	0.256	0.303
Income	0.03	0.10	-0.173	0.235	0.767
Physical illness	3.42	0.62	2.199	4.639	<0.001*
<b>Total QOL score</b>					
Constant	71.81	4.73	62.52	81.10	<0.001
Rank	1.52	0.76	0.018	3.028	0.045*
Age	0.30	0.20	-0.103	0.708	0.144
Sex	0.55	0.92	-1.260	2.360	0.551
Education	-0.01	0.18	-0.362	0.343	0.958
Service	0.01	0.14	-0.262	0.287	0.930
Years of service	-0.13	0.17	-0.463	0.206	0.451
Income	-0.26	0.21	-0.672	0.143	0.202
Physical illness	-2.39	1.23	-4.824	0.038	0.054
<b>VAS score (now)</b>					
Constant	56.71	5.89	45.13	68.29	<0.001
Rank	1.95	0.96	0.071	3.824	0.040*
Age	0.18	0.26	-0.327	0.685	0.487
Sex	1.69	1.15	-0.560	3.953	0.140
Education (years)	0.25	0.22	-0.188	0.691	0.261
Service	-0.19	0.17	-0.538	0.147	0.262
Years of service	-0.03	0.21	-0.450	0.385	0.879
Income	0.15	0.26	-0.358	0.657	0.562
Physical illness	-5.86	1.54	-8.897	-2.836	<0.001*

**Notes:** R-squared of total CHQ: 0.081; R-squared of QOL: 0.038; R-squared of VAS: 0.076. \*Statistically significant difference.

**Abbreviations:** CHQ, General Health Questionnaire-12, Chinese version; QOL, quality of life; VAS, Visual Analog Scale; SE, standardized error; CI, confidence interval.

NCOs and enlisted men; however, among enlisted men, age still played a role, as most of the subjects rating themselves as “healthy” were older than those not rating themselves as such ( $\beta = -0.160$ ;  $P = 0.013$ ). This may reflect the fact that even mandatory personnel who have spent more time in the service can better adapt to the military environment and life. On the other hand, younger soldiers, especially those who were subject to obligatory military enlistment, faced more challenges in adaptation than did the veterans. It is important to help these individuals adapt faster.

In previous studies,<sup>22,57</sup> people with more education may have a greater ability to express their emotions, and they received higher scores on health questionnaires. In our data,

however, the CHQ was inversely related to higher rank, which represents older age and greater levels of education. Those with lower levels of education may also have underestimated their health status.

The VAS of self-reported health – a subjective and overall scale for health status – was lower in NCOs and enlisted men and higher in officers. This suggested that officers with higher rank and more time spent in the military (an average of 13 years) had better subjective health. Although this was not specific to individual domains, this overall finding was similar to the results found for the CHQ.

The VAS showed a significant difference between CHQ cases and non-CHQ cases, with a disparity of up to 10 points. When multiple regression analysis was used to adjust the risk factors for VAS, rank and illness were independent risk factors. Previous studies revealed that VAS was a useful tool for quantifying QOL,<sup>58</sup> and the VAS correlated with GHQ across specific diseases.<sup>59</sup> The present study may suggest that VAS could be used as a quick screening tool for mental health, which is suitable for certain emergent stressful missions such as disaster rescue, although more studies are needed.

In the analysis of the subitems on the CHQ, NCOs had more headaches and sleep problems than did officers, and the enlisted men had more limb numbness and sleep problems than did officers. This may reflect the frequent shift work due to some security duty and heavy demands of military services loaded on the NCOs and enlisted persons. A focus on sleep hygiene and appropriate workload allocation is important. Further study of sleep in military personnel and its relation to mood and health status should be considered.

In each domain of QOL, officers had better scores than did enlisted men in terms of general QOL, physical symptoms (concentration, daily energy levels, physical pain, sleep), sex life, appearance, leisure activities, capacity for work, money, respect (a CHQ question), and food (a CHQ question). The WHOQOL scores may have a negative association with the presence and severity of psychopathology.<sup>60,61</sup> In our research, we also found that military personnel who had lower social and environmental domain scores on the WHOQOL had higher CHQ case rates. This may indicate an area for future investigation and a way to improve the status of military personnel.

There are limitations to this study. First, there were very few female subjects, and the sex-related differences could not be studied well in such a military environment. Given that so many participants did not provide marital status data, it became more difficult to analyze this potential confounder. Second, our questionnaire distribution did not cover modern military diversity and specialization. Although our

**Table 5** Comparison of previous research on psychological morbidity in different military or nonmilitary populations

Authors, publication year	Subjects in the study population	Finding	Case number
Proctor et al, 2001 <sup>42</sup>	Military (mobilized): US Gulf War-deployed veterans	Gulf War-deployed veterans report lower functional health status	141
Richardson et al, 2008 <sup>43</sup>	Military (mobilized): Canadian peacekeeping veterans	Veterans with PTSD have significant impairments in mental and physical health-related QOL	125
Forman-Hoffman et al, 2005 <sup>44</sup>	Military (mobilized): US Gulf War-deployed veterans	Two or more mental disorders associated with impaired health-related QOL	602
Fear et al, 2009 <sup>35</sup>	Military (mobilized): UK war-fighting veterans	Reported job strain and rank contributed independently to psychological symptoms	4,722
Kehle et al, 2011 <sup>45</sup>	Military (mobilized): US National Guard soldiers deployed to Iraq	Mental health diagnoses associated with poorer functioning and QOL; PTSD has the strongest relationship with poor social functioning and QOL	348
Marimoutou et al, 2012 <sup>46</sup>	Military (mobilized): French gendarmes after chikungunya infection: nonhealed, healed patients, and uninfected subjects	All dimensions of the physical and mental components were impaired in chikungunya infection nonhealed subjects	Nonhealed: 37 Healed: 48 Uninfected: 297
Tzeng et al, 2009 <sup>41</sup>	Military (peace time): Physicians, nurses, other specialists in a military hospital in South Taiwan	Younger, hypnotic drug use, and life events had a higher percentage in the psychological morbidity group, and poor QOL	Physicians: 65 Nurses: 416 Others: 304
Kongsakon et al, 2012 <sup>47</sup>	Military personnel and their families (peace time): Navy and their spouses, 6 months after the 2006 tsunami	Bodily pain, the only indicator subscale of the QOL that was statistically significantly associated with tsunami exposure	434
Mirkovic et al, 2012 <sup>48</sup>	Civilian, nonmilitary: Adult residents of northern Kosovska Mitrovica	Mental health problems were associated with older age, poor financial situation, abuse	130
Gu et al, 2009 <sup>49</sup>	Civilian, nonmilitary: A multilevel cross-sectional study of mental disorder in community settings in Zhejiang Province	The mental disorder was associated with age, marital status, residency, education, occupation, and household income.	14,632

**Abbreviations:** PTSD, posttraumatic stress disorder; QOL, quality of life.

questionnaire return rate was 60%, there were many units that were unwilling to receive it. For example, we have few data about marines and navy personnel. We do plan to conduct further qualitative research in this area with sleep or depression instruments such as the Pittsburgh Sleep Quality Index<sup>62</sup> and the Beck Depression Inventory<sup>63</sup> to render the data more complete. Finally, this is a cross-sectional study; the relationship between demographic factors and QOL is hard to determine and needs further longitudinal studies. Some analyses could only be compared with those of previous studies, but not exactly under the same demographic data.

## Conclusion

In addition to the combat readiness of our forces, disaster relief is now an important task. Our military personnel have statistically higher CHQ case rates than do members of the general population, and the average case rates of other countries' military personnel are lower than those noted in our study. Whether there is a higher risk for post-traumatic stress disorder or other mental illnesses when executing rescue or disaster missions is of serious concern. In addition, it is worth noting that rank is an independent

factor that affects the mental health of military personnel and their QOL. We should pay more attention to our military personnel's mental health, as well as to their physical health. The VAS of self-reported health might be a useful tool for screening military mental health. It could be used in a war situation or during emergency mobilization, and it takes less time than administering a more comprehensive survey.

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