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Mental health and meaning in life in Chinese military personnel: a cross-lagged analysis

Bin Liu^{1†}, Mingxuan Zou^{1,2†}, Hongxiang Bao³, Xiang Xu⁴, Xiaohui Liu⁵, Bing Zhang⁶, Qun Yang^{1*} and Fengzhan Li^{1*}

Abstract

Background The burgeoning field of research on the dual-factor model of mental health (DFM) has highlighted its significance, yet the applicability of the DFM in military personnel and its longitudinal relationships with different dimensions of meaning in life remains unclear. This study aimed to clarify the applicability of the DFM for military personnel and to investigate longitudinal relationships between the dual factors of mental health (negative factor, positive factor) and the two dimensions of meaning in life (presence of meaning, search for meaning) in military personnel.

Methods In this study, data were collected in two waves (April and August 2023) from 227 Chinese military personnel. We constructed a dual-factor model with depression as the negative factor and subjective well-being as the positive factor, and we compared it with a single-factor model to determine if DFM could be applied to military personnel. We also constructed a cross-lagged model to investigate longitudinal relationships between depression, subjective well-being, presence of meaning, and search for meaning.

Results According to the findings, military personnel fit better with the DFM than with the single-factor model. Cross-lagged analysis results revealed that both the presence of meaning and the search for meaning negatively predicted depression and positively predicted subjective well-being.

Conclusions The DFM had good applicability among military personnel. Both the presence of meaning and the search for meaning could improve military mental health, suggesting that both dimensions of meaning in life may be potential targets for improving military mental health.

Keywords Meaning in life, Depression, Subjective well-being, Dual-factor model, Cross-lagged analysis

[†]Bin Liu and Mingxuan Zou contributed equally to this work.

*Correspondence:

Qun Yang

yangqun1125@hotmail.com

Fengzhan Li

psyfengzhan@126.com

¹Department of Military Medical Psychology, Air Force Medical University, Xi'an 710032, China

²Public Health School, Shaanxi University of Chinese Medicine, Xi'an 712046, China

³Frontier Medical Service Training Brigade, Army Medical University, Hutubi 831200, China

⁴Air Force Bureau of Trainee Pilot Selection (Nanjing Central Division), Nanjing 210018, China

⁵Department of Psychology, NO. 986 Hospital of Air Force, Xi'an 710054, China

⁶1st Group of the Sixth Regiment, First Training Base of Air Force Aviation University, Changchun 130022, China



Introduction

The dual-factor model of mental health

In recent years, with the increasing emphasis on mental health, the shortcomings of the traditional mental health model centered on psychopathology indicators have begun to emerge [1]. For example, the traditional mental health model was overly reliant on the single dimension of psychopathology, which led to the study of mental health being restricted to psychopathology and ignoring the individual's ability to self-recovery and self-renewal [2], thus failing to comprehensively measure the level of mental health [3, 4]. In addition, traditional mental health models ran the risk of overestimating or underestimating mental health levels and failed to accurately assess the mental health level [5]. With the development of positive psychology, the dual-factor model of mental health (DFM) was proposed [5]. The model suggested that mental health not only included the absence of psychopathological symptoms (e.g., depression, anxiety, etc.), but also contained positive psychological states (e.g., high subjective well-being, high life satisfaction, etc.), and advocated that mental health should be comprehensively examined and understood in terms of both the negative and positive dimensional indicators [6]. Previous studies have demonstrated that the DFM has good applicability among Chinese adolescents [7], college students [8], and migrant workers [9].

Mental health in military personnel

Military personnel are responsible for the defense of the country, and their mental health, as an important part of the military's combat effectiveness, is increasingly being emphasized [10]. However, most of the existing studies on military mental health used the traditional single-factor model, which focused on the single dimension of negative, and there was a lack of research related to the dual-factor model of military mental health. Due to the special nature of the profession, military personnel were frequently exposed to closed management, intensive training, and dangerous combat environments, resulting in a high incidence of psychological problems [11]. One study investigated 1138 Air Force recruits in the United States who were referred for mental health evaluation while undergoing basic military training, and the results demonstrated that the most frequent diagnosis was depressive disorders, accounting for 31% of all diagnoses [12]. Another study surveyed 1107 Chinese soldiers and found that 25.20% of them had depression symptoms [13]. Depression can adversely affect the physical and mental health and social functioning of military personnel, even leading to suicidal behavior [14]. Hence, previous studies frequently used depression as the representative indicator of the negative dimension of military mental health [15].

Subjective well-being is defined as the individual's holistic assessment of the quality of life-based on his or her internalized standards [16]. Numerous studies have demonstrated the importance of subjective well-being for several outcomes such as mental health [17], disease recovery [18], health behavior [19], vocational success [20], and survival [21]. Therefore, the subjective well-being is considered the classic indicator of the positive dimension of mental health [22, 23]. Previous studies have found that the subjective well-being of military personnel was low and needed more attention [24]. Therefore, this study used depression as the negative factor and subjective well-being as the positive factor of mental health in military personnel.

The two-dimensional theory of meaning in life

Meaning in life is the individual's comprehension and evaluation of himself and his life, which includes emphasizing the value of his existence, possessing goals and directions in life, and constantly pursuing his ideals [25]. Meaning in life can be categorized into independent cognitive and motivational dimensions [26], where the cognitive dimension, also known as the presence of meaning, refers to the degree that individuals perceive their lives to be meaningful and worthwhile [27], and the motivational dimension, also known as the search for meaning, refers to the degree of individuals' investment in building and expanding their understanding of meaning in life [28]. Positive psychology believes that meaning in life could help individuals organize and interpret past experiences, discover what is significant in life, and guide them to achieve a sense of life satisfaction and a sense of self-transcendence [28, 29]. For military personnel, meaning in life could help them adapt to traumatic events, thereby reducing the incidence of adverse events such as post-traumatic stress disorder [30] and suicide [1], and it could help improve their physical health and reduce the incidence of physical illnesses and somatic problems [31]. Moreover, meaning in life was also considered to be an important protective factor for mental health, and previous studies found that meaning in life was significantly negatively correlated with psychotic symptoms such as depression [32–34], and significantly positively correlated with positive psychological states such as subjective well-being [35–37].

However, further studies have found that different dimensions of meaning in life may have different roles in mental health. On the one hand, the presence of meaning was steadily and positively associated with mental health [38], which was mainly manifested by the significantly negative correlation between the presence of meaning and psychotic symptoms [39, 40], and the significantly positive correlation with positive psychological states [39, 41, 42]. On the other hand, the relationship between the

search for meaning and mental health is currently ambiguous. Some scholars argue that the search for meaning is beneficial to mental health [43]. Studies supporting this view suggest that the search for meaning in life leads to a sense of self-transcendence and fulfillment, which could promote mental health [29, 44]. Others hold that the search for meaning is harmful to mental health [45–48]. Research supporting this view suggests that the meaning-seeking process can be fraught with frustration and disappointment, which could be a threat to mental health [49]. Hence, the controversial point of current research lies in whether the search for meaning enhanced (Gain effect) or diminished (Discount effect) the contribution of the presence of meaning to mental health.

In summary, there are three issues that need to be further explored. Firstly, most of the studies on military mental health were single-factor models and mainly focused on the negative single dimension [50], so the applicability of the DFM in military personnel is unclear. Secondly, previous studies on the meaning in life regularly regarded it as a whole [32–34, 37], so the relationships between its two dimensions (presence of meaning, search for meaning) and mental health in military personnel were not yet clear. Lastly, most of the previous studies were cross-sectional [50], which limited further understanding of the longitudinal relationships among variables. Therefore, the present study aimed to clarify the applicability of the DFM for military personnel and to investigate the longitudinal relationship between the dual factors of mental health (depression, subjective well-being) and the two dimensions of meaning in life (presence of meaning, search for meaning) in military personnel.

Materials and methods

Participants

The cluster sampling method was used to select military personnel from a ministry in Shaanxi Province as participants, and a 4-month, 2-stage longitudinal survey was conducted on them. The first survey (Time1, T1) and the second survey (Time2, T2) were conducted on April 10, 2023 and August 10, 2023, with 240 and 236 valid questionnaires collected, respectively. Participants were required to complete a written questionnaire under the guidance of well-trained investigators, and the completed questionnaires were collected on the spot. It should be noted that the guidance proffered by the investigators did not pertain to the discussion of the content of the questionnaire, but only filled instructions for completing it, such as pointing out where to fill in the answers. The data from T1 and T2 were matched by basic information, and finally 227 data were used as the sample for analysis. In this study, all participants were male with a mean age of 22.93 ± 2.95 years. Informed consents were obtained

from all participants for this study. This study has been reviewed and approved by the Ethics Committee of the First Affiliated Hospital of the Fourth Military Medical University (No.KY20202063-F-2).

Measures

Chinese meaning in life questionnaire (C-MLQ)

The scale was developed by Steger [26] and revised by Wang [51], and was mainly used to assess individuals' perceptions of meaning in life. The scale consists of 10 items and can be categorized into two dimensions: presence of meaning (e.g., "I know my life meaning") and search for meaning (e.g., "I'm looking for something that makes my life meaningful"). Items were rated on a 7-point scale (1 = *completely disagree*, 7 = *completely agree*). The score of each dimension is the sum of the scores of the items it contains, and the higher the score, the stronger the degree. The Cronbach's α coefficients for the total scale were 0.832 (T1) and 0.788 (T2), the Cronbach's α coefficients for the presence of meaning dimension were 0.914 (T1) and 0.875 (T2), and the Cronbach's α coefficients for the search for meaning dimension were 0.833 (T1) and 0.773 (T2).

Patients' health questionnaire depression scale-9 item (PHQ-9)

The PHQ-9 scale was developed based on the nine diagnostic criteria for depression disorder in the DSM-IV and was primarily used to assess the degree of depression symptoms [52]. The scale consists of 9 items and is rated on a 4-point scale (0 = *never*, 3 = *almost every day*). The total score is the sum of the scores of all the items, with a higher score representing more severe depression symptoms. The Cronbach's α coefficients for the scale were 0.885 (T1) and 0.901 (T2).

Subjective well-being scale (SWB)

The scale was developed by Lyubomirsky [53] and revised by Bi [54]. Previous studies have demonstrated its good applicability in Chinese populations [55]. The scale consists of 4 items and is rated on a 7-point scale (1 = *very unhappy*, 7 = *very happy*). The sum of the scores for each item is the total score for the scale, with the higher total score indicating the higher subjective well-being. The Cronbach's α coefficients for the scale were 0.756 (T1) and 0.734 (T2).

Statistical analysis

Data were analyzed using SPSS version 26.0 (IBM Corporation, Armonk NY, USA), and data were presented as n (%) for categorical variables and mean \pm SD for numerical variables. The model fit comparisons and cross-lagged analysis were performed using Mplus version 8.0 (Muthen & Muthen, Los Angeles, CA, USA). To

test the applicability of the DFM for military personnel and to demonstrate that the dual-factor model is better than the single-factor model, this study compared the fit of the two models with reference to the modeling strategy of Joreskog [56]. The single-factor model constructed a latent variable representing overall mental health, with test items for the positive dimension (subjective well-being) being positive factor loads, and test items for the negative dimension (depression) being negative factor loads. The dual-factor model constructed two latent variables, the positive and negative dimensions of mental health. The test items on subjective well-being were used as observable variables for the positive dimension, and the test items on depression were used as observable variables for the negative dimension, and two latent variables were correlated with each other. The model fit was evaluated using the chi-square (χ^2), degrees of freedom (df), comparative fit index (CFI), standard root mean square (SRMR), and root mean square error of approximation (RMSEA) [57]. According to prior studies, $\chi^2/df < 5$, CFI greater than 0.90, and RMSEA and SRMR less than 0.08 indicated that the model fit was acceptable [58].

In addition, the cross-lagged analysis was performed to examine the longitudinal relationships between mental health and meaning in life in military personnel. Previous studies have shown that the presence of meaning may change with age [59] and that the subjective well-being may be affected by income [60]. Hence, this study constructed a cross-lagged model with age and income as covariates, and the presence of meaning, search for meaning, depression, and subjective well-being as observable variables. The cross-lagged model explicitly controls for autoregression among variables, known as stability. Put another way, after controlling for

the variance associated with the effect of the preceding variable at T1, the residual variance in the change at T2 is attributed to other variables. Hence, the path coefficients demonstrating the cross-lagged relationships between variables are of substantial significance for interpretation. The correlations of the pairs of four variables at the same time were evaluated and a saturated model was assumed. The tested model is shown in Fig. 1.

Results

Common method bias test

Since all the data in this study were obtained from the reports of the subjects, the study used Harman's single-factor test for the common method bias test [61]. The test results of the two surveys showed that the factors with eigenvalues greater than 1 were 5 (T1) and 4 (T2), and the variance explanation rate of the first factor was 33.792% (T1) and 35.549% (T2), which was less than the critical criterion of 40% [61], therefore, there was no serious common method bias in this study.

Measurement invariance test

To examine for measurement invariance of the scale over time, this study tested the configural invariance model, metric invariance model, and scalar invariance model of the presence of meaning, search for meaning, depression, and subjective well-being [62]. Based on previous studies, $\Delta CFI < 0.02$, and $\Delta RMSEA < 0.03$ indicated that the variables have comparable measurement structures across time [63–65]. According to the fit indices, the configural, metric, and scalar invariance were all established. For the subsequent analyses, the constraints for scalar invariance were retained. The specific results are shown in Table 1.

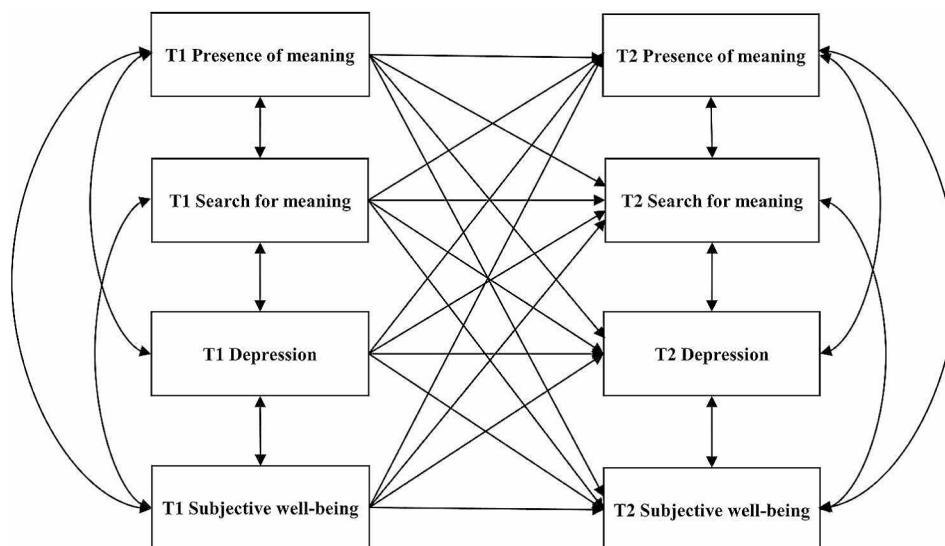


Fig. 1 The tested model. Notes T1: Time 1, T2: Time 2

Table 1 Measurement invariance test of variables

	χ^2	df	CFI	RMSEA (90% CI)	SRMR	Δ CFI	Δ RMSEA
Presence of meaning							
Configural invariance	66.07	10	0.968	0.157 ([0.122, 0.194])	0.023		
Metric invariance	69.03	14	0.968	0.132 ([0.102, 0.163])	0.043	0.000	0.025
Scalar invariance	76.53	18	0.966	0.120 ([0.093, 0.148])	0.037	0.002	0.012
Search for meaning							
Configural invariance	53.93	10	0.946	0.139 ([0.104, 0.177])	0.044		
Metric invariance	63.36	14	0.939	0.125 ([0.094, 0.157])	0.087	0.007	0.014
Scalar invariance	68.96	18	0.937	0.112 ([0.084, 0.140])	0.094	0.002	0.013
Depression							
Configural invariance	295.57	54	0.886	0.140 ([0.125, 0.156])	0.057		
Metric invariance	356.17	62	0.861	0.145 ([0.130, 0.159])	0.093	0.025	-0.005
Scalar invariance	366.42	70	0.860	0.137 ([0.123, 0.151])	0.094	0.001	0.008
Subjective well-being							
Configural invariance	1.17	4	1.000	0.000 ([0.000, 0.048])	0.008		
Metric invariance	1.59	7	1.000	0.000 ([0.000, 0.000])	0.016	0.000	0.000
Scalar invariance	4.16	10	1.000	0.000 ([0.000, 0.015])	0.019	0.000	0.000

Table 2 Comparisons of the single-factor model and dual-factor model of mental health

Time	Model style	χ^2	df	χ^2/df	CFI	RMSEA (90% CI)	SRMR
T1	Single-factor model	396.06	65	6.093	0.754	0.150 ([0.136, 0.164])	0.101
	Dual-factor model	145.40	64	2.272	0.939	0.075 ([0.059, 0.091])	0.049
T2	Single-factor model	505.57	65	7.778	0.723	0.173 ([0.159, 0.187])	0.097
	Dual-factor model	253.42	64	3.960	0.881	0.114 ([0.100, 0.129])	0.056

Note Single-factor model refers to the single-factor model of mental health, Dual-factor model refers to the dual-factor model of mental health; T1: Time 1, T2: Time 2

Table 3 Statistical description and correlation analysis

Variables	1	2	3	4	5	6	7	8
1.T1 Presence of meaning	1							
2.T1 Search for meaning	0.20**	1						
3.T1 Depression	-0.41***	-0.24***	1					
4.T1 Subjective well-being	0.60***	0.24***	-0.41***	1				
5.T2 Presence of meaning	0.70***	0.28***	-0.39***	0.55***	1			
6.T2 Search for meaning	0.27***	0.54***	-0.15*	0.21**	0.17*	1		
7.T2 Depression	-0.41***	-0.27***	0.43***	-0.34***	-0.46***	-0.29***	1	
8.T2 Subjective well-being	0.47***	0.38***	-0.49***	0.53***	0.51***	0.39***	-0.45***	1
Mean	28.81	27.90	1.64	23.29	29.05	27.46	1.80	23.09
SD	5.64	5.79	2.67	4.17	5.53	5.28	2.94	4.19

Note Mean and SD refer to the manifest variables; T1 = Time 1, T2 = Time 2; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The applicability test of the DFM in military personnel

To examine the applicability and rationality of the DFM for military personnel and to certify that the dual-factor model is better than the single-factor model for the measurement of military mental health, this study validated the two models using the testing strategy of the structural equation model. As shown in Table 2, the results showed that the fit indicators of the DFM were better than the single-factor model at both T1 and T2, and thus the dual-factor model has higher applicability.

Statistical description and correlation analysis

The results of correlation analysis showed that there was a significant longitudinal correlation between the

measures across two time points: the presence of meaning ($r=0.70$), search for meaning ($r=0.54$), depression ($r=0.43$), and subjective well-being ($r=0.53$, $p < 0.001$, respectively) at T1 and T2, indicating that the variables were all stable. The results of the simultaneous correlation analysis showed that the presence of meaning, search for meaning, depression, and subjective well-being were significantly correlated with each other at T1, and the same results were found at T2, which indicated that the variables had good simultaneous correlations. The specific results are shown in Table 3. Therefore, the four variables of presence of meaning, search for meaning, depression, and subjective well-being were suitable for the cross-lagged analysis [66].

Cross-lagged analysis

As shown in Fig. 2, the cross-lagged analysis results showed that T1 presence of meaning significantly predicted T2 presence of meaning ($\beta=0.56, p < 0.001$), T1 search for meaning significantly predicted T2 search for meaning ($\beta=0.50, p < 0.001$), T1 depression symptom significantly predicted T2 depression symptom ($\beta=0.27, p < 0.001$), and T1 subjective well-being significantly predicted T2 subjective well-being ($\beta=0.19, p=0.005$). These results suggested that the presence of meaning, search for meaning, depression symptoms, and subjective well-being were stable.

And cross-lagged regression results showed that T1 presence of meaning significantly predicted T2 search for meaning ($\beta=0.22, p=0.002$), T2 depression symptom ($\beta = -0.28, p < 0.001$), and T2 subjective well-being ($\beta=0.15, p=0.031$); T1 search for meaning significantly predicted T2 presence of meaning ($\beta=0.13, p=0.008$), T2 depression symptom ($\beta = -0.13, p=0.026$), and T2 subjective well-being ($\beta=0.15, p=0.012$); T1 depression symptom significantly predicted T2 subjective well-being ($\beta = -0.26, p < 0.001$), but did not significantly predict T2 presence of meaning ($\beta = -0.07, p=0.175$) or T2 search for meaning ($\beta=0.06, p=0.339$); T1 subjective well-being significantly predicted T2 presence of meaning ($\beta=0.16, p=0.002$), but did not significantly predict T2 search for meaning ($\beta = -0.03, p=0.666$) and T2 depression symptom ($\beta = -0.02, p=0.766$). These results suggested that the presence of meaning and the search for meaning predicted each other; and that both the presence of meaning and the search for meaning negatively predicted depression and positively predicted subjective well-being, in other words, both the presence of meaning and the

search for meaning positively predicted mental health of military personnel.

Discussion

Compared to the single-factor model of mental health, the DFM had a better fit in military personnel, which was consistent with the results of previous studies in the general population [32, 34]. Therefore, the DFM had good applicability to military personnel. Meanwhile, the results of this study also supported the premise of the DFM, which was that mental health consisted of two separate but interrelated constructs, positive and negative dimensions [67]. The results of this study suggested that when assessing the level of mental health of military personnel, both positive and negative aspects should be comprehensively assessed rather than simply focusing on the single negative aspect.

Results of cross-lagged analysis showed that the prior presence of meaning significantly negatively predicted later depression, and significantly positively predicted later subjective well-being, indicating that the presence of meaning was beneficial to military mental health, which was consistent with previous research [38]. The presence of meaning emphasized the understanding and perception of meaning in life [68], and was considered as a basic psychological need in daily life, the satisfaction of which brought positive emotional experiences such as subjective well-being to individuals [69]. It has been found that the presence of meaning can enhance individuals' positive emotions [70]. According to the broaden-and-build theory of positive emotions, positive emotions can promote the accumulation of resources [71], which can improve individuals' subjective well-being and prevent

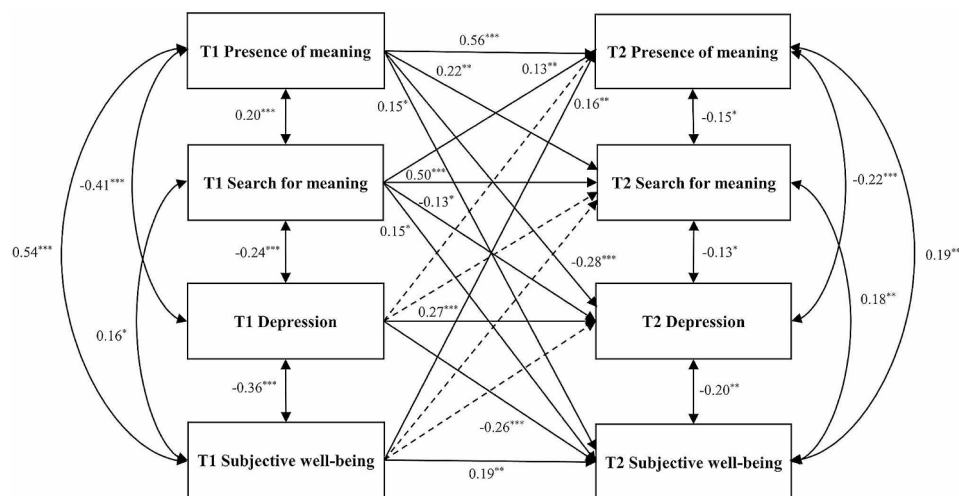


Fig. 2 The cross-lagged model of the presence of meaning, search for meaning, depression, and subjective well-being in military personnel. Note T1 =Time 1, T2=Time 2; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Solid lines represent relationships that are significant, and dashed lines represent relationships that are not significant. The numbers next to the solid lines represent the standardized coefficient (β). Non-significant values and covariates are not presented in the figure

the occurrence of depression [72]. In addition, the presence of meaning has been found to be positively correlated with positive coping styles (e.g., problem solving, positive reappraisal) and negatively correlated with negative coping styles (e.g., denial, avoidance, and substance dependence) [73, 74]. When confronting negative events, individuals with a high presence of meaning tended to adopt positive coping styles, which could effectively help individuals reduce negative emotions such as anxiety and depression [75]. Research also showed that individuals with a high presence of meaning experienced less psychological conflict when making health-related decisions, and tended to self-regulate for better mental health [76]. Therefore, the presence of meaning was an important protective factor for the mental health of military personnel.

The results also showed that prior search for meaning also negatively predicted later depression and positively predicted later subjective well-being, meaning that the search for meaning was similarly beneficial to military mental health. In other words, the search for meaning reinforced the promotional effects of the presence of meaning on the mental health of military personnel, demonstrating the gain effect. Some researchers argued that the search for meaning can be equivalent to a cognitive schema that enhances the role of meaning experience in individuals' assessment of positive psychological states such as life satisfaction [43]. Interestingly, the positive or negative effect of the search for meaning on the presence of meaning seems to be related to cultural contexts. Previous studies found that the search for meaning and presence of meaning showed negative correlations in samples from the United States and Australia [61, 62], and positive correlations in samples from China and Japan [35, 60]. Thus, it seems that the two dimensions of meaning in life are mutually reinforcing in collectivistic cultures and mutually antagonistic in individualistic cultures [40]. Second, studies have found that a higher presence of meaning can also expand and enrich the foundational parts of meaning in life, thus allowing individuals to have higher subjective well-being and lower depression in their search for meaning [77]. In addition, Steger [78] categorized meaning in life into four basic types based on different combinations of the presence of meaning and the search for meaning, including meaning diffusion (low presence of meaning and low search for meaning), meaning exclusion (high presence of meaning and low search for meaning), meaning extension (high presence of meaning and low search for meaning), and meaning acquisition (high presence of meaning and high search for meaning). Significant differences in indicators of psychological functions such as depression and hope have been found among individuals with different life meaning types [46, 79], with the negative effects

of search for meaning manifested primarily in individuals with a low presence of meaning, and positive effects manifested in primarily individuals with high presence of meaning [80]. As a noble profession, military personnel bore the responsibility of protecting the country and had high social statuses, their presence of meaning may be higher, so the search for meaning may mainly play the gain effect on the military personnel.

However, there were also the following limitations in this study. Firstly, the participants in this study were all male military personnel, and there was a lack of data on female military personnel, so it may not be a comprehensive representation of the military population, thus subsequent studies could add female military personnel to enhance the applicability of the findings to the military population. Secondly, only two time points of data were collected in this study, which prevented the researcher from explaining the mediating role of the variables, and subsequent studies could collect data from three time points to test whether any variables play a mediating role. Lastly, the positive and negative dimensions of mental health belonged theoretically to artificially synthesized composite indicators, and only using depression as the negative dimension and subjective well-being as the positive dimension may not comprehensively reflect the mental health of military personnel. Therefore, future research could incorporate more observational indicators in each of the two dimensions to more comprehensively reflect the mental health of military personnel.

Conclusion

In summary, this study verified the applicability of DFM for military personnel and investigated the longitudinal relationship between the dual factors of mental health and the two dimensions of meaning in life in military personnel. We found that the DFM had better applicability in military personnel compared to the single-factor model, suggesting that both negative and positive dimensions should be investigated in order to comprehensively assess the mental health of military personnel. Meanwhile, this study found that both the cognitive and motivational dimensions of meaning in life can positively predict military mental health, which offered potential improvement targets. Therefore, when improving the mental health of military personnel in the future, mental health workers could consider starting from the perspective of the meaning of life. By improving the level of presence of meaning (e.g., by increasing the respect of the whole society for the military profession, and by improving the level of the quality of life of the military personnel), as well as encouraging the military personnel to seek more meaning (e.g., by encouraging military personnel to develop their hobbies, and by encouraging military

personnel to pursue honors), it will ultimately promote the overall improvement of the military mental health.

Abbreviations

DFM	Dual-factor model of mental health
C-MLQ	Chinese meaning in life questionnaire
PHQ-9	Patients' health questionnaire depression scale-9 item
SWB	Subjective well-being scale
CFI	Comparative fit index
SRMR	Standard root mean square
RMSEA	Root mean square error of approximation

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Author contributions

BL and MXZ designed of the study, collected and analyzed the data, interpreted the study results, drafted, revised, and approved the final manuscript. HXB, XX, XHL, and BZ collected the data, conducted preliminary data analysis, revised and approved the final manuscript. QY and FZL conceived and designed the study, revised and approved the final manuscript. All authors read and approved the final study manuscript.

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Data availability

The datasets generated and/or analyzed in this study are not available, but may be available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

This study has been reviewed and approved by the Ethics Committee of the First Affiliated Hospital of the Fourth Military Medical University (No. KY20202063-F-2). Informed consents were obtained from all participants for this study.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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