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Extrinsic and Intrinsic Determinants of Depression and Mental Well-Being among Korean Army Officers and Non-Commissioned Officers

Hyunyup Lee^{1,*} , Sungrok Kang¹ , Yoonyoung Choi¹ and Eric S. Cerino²

¹Department of Psychology and Management, Korea Military Academy, Seoul, Republic of Korea

²Department of Psychological Sciences, Northern Arizona University, Flagstaff, AZ, USA

*Corresponding Author: Hyunyup Lee. Email: leehyuny@kma.ac.kr

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ABSTRACT: Background: Despite growing concerns about the mental health of professional military personnel, little is known about protective factors for mental health among military officers and non-commissioned officers (NCOs). The present study aimed to examine the differential and interaction effects of extrinsic and intrinsic protective factors on depression and mental well-being among Korean professional military personnel. **Methods:** A total of 500 Korean officers and NCOs completed a self-administered questionnaire that assessed extrinsic factors (salary satisfaction, work environment satisfaction), intrinsic factors (occupational calling, positive appraisals of military service), and the two mental health outcomes. **Results:** Hierarchical regression revealed that higher work environment satisfaction was independently associated with lower depression ($t = -2.54, p < 0.05$), while salary satisfaction was positively related to mental well-being ($t = 2.58, p < 0.05$). Intrinsic factors were more robust predictors; higher occupational calling and positive appraisals were significantly associated with lower depression ($t = -2.33, p < 0.05$ and $t = -6.05, p < 0.001$, respectively) and higher well-being ($t = 10.52$ and $t = 7.16, p < 0.001$, respectively). Moderation analyses further demonstrated that salary satisfaction statistically but marginally amplified the protective effects of intrinsic factors on mental health. These results underscore the importance of simultaneously considering both external and internal factors when promoting mental health among professional military personnel. **Conclusions:** The findings demonstrate that while both extrinsic and intrinsic factors are essential, intrinsic resources including occupational calling and positive appraisals serve as more robust and consistent primary buffers against psychological distress. Extrinsic rewards like salary satisfaction can play a synergistic role in amplifying the protective effects of these internal motivators. Therefore, the mental health of professional military personnel is best maintained through a holistic strategy that prioritizes cultivating internal resilience and an organizational culture centered on finding profound meaning and value in service.

KEYWORDS: Depression; mental well-being; salary satisfaction; occupational calling; positive appraisals of military service

1 Introduction

The Republic of Korea faces a unique and persistent security challenge due to its ongoing confrontation with North Korea. Within this high-stakes environment, professional military personnel including officers and non-commissioned officers (NCOs) play a pivotal role in command decisions and organizational stability. However, there has been a recent increase in negative indicators of mental health of this group. Turnover rate of active-duty professional personnel increased by 24.1% from 2022 to 2023 [1]. In addition, the number of suicide cases among officers and NCOs exceeded that of enlisted soldiers from 2019 to 2023 [2], and

the number of counseling cases involving service maladjustment, mental health concerns, and suicidal ideation had more than doubled from 2017 to 2022 [3]. Despite these escalating concerns, less is known about protective factors for their mental health, except for a few studies examining correlates of suicidal ideation and behaviors [4–6]. Unlike enlisted soldiers who are required to serve in the army for 1–2 years, officers and NCOs serve as professional military personnel over longer periods and play a central role in military training, leadership, and command decisions. Thus, it is important to investigate determinants of mental health in professional military personnel.

It is well-known that both extrinsic factors, such as residential environment [7] or salary [8], and intrinsic resources, such as occupational calling, are associated with mental health [9]. Extrinsic and intrinsic factors regarding mental health in the workplace can be drawn from Herzberg's two-factor theory, in which two categories of factors were identified: hygiene factors and motivators [10]. Hygiene (or extrinsic) factors are associated with the desire to avoid discomfort in job tasks, with representative operationalizations including one's salary, working conditions, and job security [11]. In contrast, motivators (or intrinsic) factors are related to the desire for growth and a positive attitude toward work, with representative operationalizations including the nature of the work itself, opportunities for growth, and achievement [11]. Although the two-factor theory was developed to identify variables regarding job satisfaction or dissatisfaction, prior research has provided evidence that the two factors can be related to mental health as well. For example, an increase in income significantly contributed to improvements in mental health [8], and higher satisfaction with salary was associated with higher levels of life satisfaction [12]. Individuals who were dissatisfied with their work environment (e.g., dissatisfaction with indoor air quality and lighting) reported lower levels of subjective well-being [13].

For intrinsic motivators, individuals who perceived their work as meaningful and experienced a sense of calling reported lower levels of depression [14] and higher subjective well-being [15]. Perceived motivation for self-improvement or personal growth was positively associated with life satisfaction [16,17]. In addition, studies of veterans showed that positive appraisals or experiences during military service played a protective role against suicidal ideation and post-traumatic stress disorder symptoms [18–20]. The impact of intrinsic factors on mental health can be further elucidated through self-determination theory (SDT), which posits that the fulfillment of basic psychological needs consisting of autonomy, competence, and relatedness is essential for personal well-being [21]. A strong sense of calling involves perceiving one's work as having transcendent meaning and purpose. Individuals with a high sense of calling tend to engage in their duties with autonomous motivation. In the highly hierarchical and constrained environment of the military, such a calling may serve as a critical internal resource, allowing service members to derive meaning from their roles and maintain psychological health. Positive appraisals of military service function as a protective mechanism. By recognizing the positive consequences of their service, such as self-discipline, lifelong friendships, and a clearer direction in life, military personnel can mitigate the impact of the inherent stressors of military life.

As such, salary and work environment are extrinsic factors, and occupational calling and positive work appraisals are intrinsic factors that may be associated with mental health in Korean officers and NCOs. Despite the recognized importance of these determinants, their differential and interaction effects on diverse mental health outcomes among military personnel remain poorly understood. For example, prior research has indicated that while both intrinsic and extrinsic motivation are positively correlated with employee retention, intrinsic motivation alone maintains a significant association with retention after accounting for relevant covariates [22]. Additionally, inverse relationships have been demonstrated between these two types of motivation and turnover intention, such that higher extrinsic motivation

relates to increased turnover intention, whereas higher intrinsic motivation is associated with a decrease in such intentions [23]. In contrast to these findings of the maladaptive role of extrinsic factors, a study of health care providers showed that extrinsic components, including salary and supervision, had a stronger benefit for quality of work life satisfaction, compared to intrinsic components such as skill discretion and decision latitude [24]. Similarly, extrinsic academic motivation contributed more than intrinsic academic motivation to the variance in positive affect and meaning in life among university students [25]. These conflicting results indicate that the primary determinants of mental health may be contingent upon the specific characteristics of the population under study. Thus, research is needed to explicitly examine the factors that alleviate psychological distress and foster positive mental well-being among professional military personnel, who are frequently exposed to a multitude of stressors.

Another methodological approach to elucidating the influence of extrinsic and intrinsic factors on mental health is to examine the interrelationship between these factors. A 40-year meta-analysis revealed that extrinsic incentives and intrinsic motivation are not mutually exclusive, but rather should be considered simultaneously as a synergistic effect to understand and enhance work performance [26]. In addition, past research shows that reward-related extrinsic motivation moderated the effect of intrinsic motivation on creativity and innovation performance, such that the benefits of intrinsic motivation for creativity and innovation performance were amplified among people with higher reward-related extrinsic performance [27]. Research on the interplay between extrinsic and intrinsic factors has largely focused on performance-related outcomes. However, these interactions may be equally critical for the mental health of professional military personnel, who serve out of a profound sense of sacrifice and duty rather than for mere financial reward [28].

In this context, the current study aimed to examine the differential and interaction effects of extrinsic (salary and work environment) and intrinsic (occupational calling and positive appraisals of military service) determinants of mental health among professional military personnel. In the context of the South Korean military, where personnel fulfill duties out of a sense of personal sacrifice and commitment, salary satisfaction may function as a foundational support. When service members are satisfied with their extrinsic rewards, the positive impact of their intrinsic calling and positive appraisals on mental health outcomes may be amplified. This study, therefore, examines these interaction effects to determine if high levels of extrinsic satisfaction strengthen the protective role of intrinsic resources against depression and in favor of mental well-being. In addition, given that mental health is conceptualized as the absence of psychopathology and the presence of mental well-being [29], this study considered both depression and well-being as outcome variables to obtain a more holistic understanding of service members' mental health.

Based on the aforementioned theoretical framework and prior research, the following hypotheses were examined:

Hypothesis 1: *Both extrinsic and intrinsic factors will be significantly associated with depression and mental well-being.*

Hypothesis 2: *Extrinsic factors will significantly moderate the influence of intrinsic factors on mental health outcomes, such that high levels of extrinsic satisfaction will amplify the protective effects of intrinsic resources on both depression and well-being.*

Notably, regarding Hypothesis 1, as previous literature has yielded inconsistent findings concerning the relative importance of extrinsic versus intrinsic determinants, this study aims to examine their unique contributions exploratorily rather than establishing a specific hierarchy of influence.

2 Materials and Methods

2.1 Participants and Procedures

Research data were collected from active-duty Army officers and NCOs who were recruited from three divisions and one brigade stationed in South Korea. Exclusion criteria for the current study were (a) enlisted soldiers, (b) NCOs in a fixed-term position, and (c) colonels and generals. Researchers visited four units in June 2024 and conducted a cross-sectional survey. The participants were first given a briefing on the purpose of the research and asked to complete an informed consent form and a voluntary self-rated questionnaire. Initially, the survey was administered to 818 participants. However, a total of 500 individuals ultimately submitted both the informed consent form and the completed questionnaire. Among the 500 collected responses, no cases of careless responding, such as numerous missing values or continuous selection of the same option, were identified. Participants varied depending on units (Unit 1: $N = 136$, Unit 2: $N = 115$, Unit 3: $N = 107$, Unit 4: $N = 142$), and their mean age was 30.4 ($SD = 7.4$) years (Range 18–52). Most of them were male (87.2%), NCOs (72.4%), not currently married (61.8%), and currently attending or graduated from college/university (77%). Ethical approval was granted by the Institutional Review Board (IRB) of the Armed Forces Medical Command (AFMC2024-04-003-001).

2.2 Measures

Depression was measured by the 9-item Patient Health Questionnaire-9 (PHQ-9) [30]. Participants rated how often they had been bothered by nine depressive symptoms (e.g., “little interest or pleasure in doing nothing”) over the last two weeks on a 4-point Likert-type scale (0 = not at all to 3 = nearly every day). The sum of scores ranges from 0 to 27, with higher scores indicating higher levels of depressive symptoms. The severity of depression can be divided into five groups according to the sum of scores range: 0–4 (minimal), 5–9 (mild), 10–14 (moderate), 15–19 (moderately severe), and 20–27 (severe). The PHQ-9 demonstrated adequate internal consistency (Cronbach’s $\alpha = 0.87$) in this study.

Mental well-being was measured by the 14-item mental health continuum-short form (MHC-SF), which was designed to assess positive mental health that relates to emotional well-being (e.g., “interested in life”), psychological well-being (e.g., “good at managing the responsibilities of your daily life”), and social well-being (e.g., “that you had something important to contribute to society”) [31]. Participants rated the frequency of feelings of well-being over the last month on a 6-point Likert-type scale (0 = never to 5 = every day). The sum of scores ranged from 0 to 70, with higher scores indicating a higher presence of mental well-being. The MHC-SF demonstrated adequate internal consistency (Cronbach’s $\alpha = 0.94$) in this study.

Demographic variables included chronological age, sex, education, marital status, and military rank. Education was measured on a 3-point scale (1 = high school graduate or below, 2 = current college/university student or graduate, 3 = graduate school and above). Sex (1 = male, 2 = female), marital status (1 = currently not married, 2 = currently married), and military rank (1 = NCOs, 2 = officers) were dichotomized.

Extrinsic factors were operationalized as salary and work environment. Participants were asked to rate subjective satisfaction with their salary (“To what extent are you satisfied with your salary?”) from 0 to 100, with higher values indicating more satisfaction. Perceived work environment satisfaction was assessed in the same way, using a question (“To what extent are you satisfied with your work environment, such as office and air conditioning/heating system?”) that was rated from 0 to 100, with higher values indicating more work environment satisfaction.

Intrinsic factors were operationalized as calling and positive appraisals of military service. Calling was measured by the 9-item Multidimensional Calling Measure (MCM), which reflects five core categories:

“transcendent guiding force, identification with one’s work, person-environment fit, value-driven-behavior, and sense and meaning” [32]. The items were rated on a 6-point Likert-type scale (1 = strongly disagree to 6 = strongly agree). The sum of scores ranged from 9 to 54, with higher scores indicating higher levels of vocational calling. The MC demonstrated adequate internal consistency (Cronbach’s $\alpha = 0.88$) in this study.

Positive appraisals of military service were measured using eight items of the Desirable Military Experience scale [18]. Of the 14-item original scale that assessed positive consequences of military service, the current study used eight items that are pertinent to non-deployment active-duty military personnel; “lifelong friends, learned to cope with adversity, greater self-discipline and dependability, positive feeling about self, learned cooperation and teamwork, clearer direction and purpose in life, better job skills and options, and rewarding memories”. Each item was rated on a 4-point Likert-type scale (1 = not at all to 4 = a lot). The sum of scores ranged from 8 to 32, with higher scores indicating higher levels of positive appraisals of military service. The Desirable Military Experience survey demonstrated adequate internal consistency (Cronbach’s $\alpha = 0.89$) in this study.

2.3 Statistical Analyses

We first computed descriptive statistics and bivariate correlations for study variables, and then implemented hierarchical regression to examine the effects of extrinsic and intrinsic factors on mental health outcomes (depression, mental well-being). Demographic variables were first included in Step 1 of the regression to identify their associations with the outcome variables, and then to control for their influence when examining the unique contributions of other predictors to the variance of mental health in subsequent regression steps. Next, two extrinsic factors (salary and work environment) were added at Step 2, followed by two intrinsic factors (calling and positive appraisals) at Step 3. In additional models, we analyzed interaction effects between the extrinsic factors and the intrinsic factors on mental health to ascertain if the impact of the extrinsic factors on depression or mental well-being varies as a function of intrinsic factors. Primary study variables were mean-centered in the moderated multiple regressions to alleviate multicollinearity in regression coefficients [33]. There were no missing values in this sample, and SPSS 27 (IBM Corp., Armonk, NY, USA) was used for statistical analyses. All hypothesis tests were performed at a significance level of $\alpha = 0.05$.

3 Results

3.1 Descriptive Statistics and Bivariate Correlation Analyses

Descriptive statistics and bivariate correlations are presented in Table 1. The extrinsic factors (salary and work environment) and the intrinsic factors (calling and positive appraisals) were all negatively associated with depression ($r = -0.16$ to -0.37 , $p < 0.001$), but positively correlated with mental well-being ($r = 0.13$ to 0.53 , $p < 0.01$). Thus, military personnel who were satisfied with their salary and work environment had lower levels of depression and higher levels of mental well-being; the same patterns were observed in the relationships between the intrinsic factors and mental health outcomes. In general, the extrinsic factors and the intrinsic factors were found to be moderately associated with their same construct factors ($r = 0.31$ for salary and work environment, $r = 0.51$ for calling and positive appraisals); however, the two factors were weakly correlated with each other ($r = 0.12$ to 0.25), including a non-significant relationship between work environment and positive appraisals of military service. As expected, depression was negatively related to mental well-being, indicating that military personnel with elevated depressive symptoms tended to report lower life satisfaction and diminished psychological and social well-being. Among demographic variables, age, sex, education, and marital status were weakly associated with depression and mental well-being ($r = -0.10$ to 0.16 , $p < 0.05$),

with a non-significant relationship between education and depression. However, military rank was neither statistically related to depression nor mental well-being; thus, we excluded military rank as a predictor in the following regression analyses. Lastly, all study variables fell within acceptable ranges for normality, with absolute skewness values < 3 and absolute kurtosis values < 8.

Table 1: Descriptive statistics and bivariate correlations among study variables (N = 500).

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Age	–										
2. Sex ¹	–0.08	–									
3. Education	0.23***	0.07	–								
4. Marital status ²	0.68***	–0.02	0.18***	–							
5. Military rank ³	–0.01	0.02	0.32***	–0.10*	–						
6. Salary	0.32***	0.06	0.15**	0.22***	0.15***	–					
7. Work environment	0.02	0.04	0.01	0.02	0.13**	0.31***	–				
8. Calling	0.14**	–0.07	0.08	0.16**	–0.01	0.25***	0.12*	–			
9. Positive appraisals	0.01	–0.12*	0.01	0.09*	–0.08	0.16***	0.05	0.51***	–		
10. Depression	–0.10*	0.16***	–0.07	–0.10*	0.05	–0.19***	–0.16***	–0.30***	–0.37***	–	
11. Mental well-being	0.09*	–0.17***	0.09*	0.16**	0.05	0.25***	0.13**	0.60***	0.53***	–0.47***	–
Mean	30.04	1.13	1.89	1.38	1.28	41.26	72.10	38.57	26.77	4.20	39.83
Standard Deviation	7.41	0.33	0.47	0.49	0.45	25.43	24.12	8.47	4.69	4.59	14.56
Range	18–52	1–2	1–3	1–2	1–2	0–100	0–100	13–54	11–32	0–27	2–70

Note: Pearson correlations for continuous variables and Spearman correlations for categorical variables. ¹male = 1, female = 2; ²currently not married = 1, currently married = 2; ³NCOs (non-commissioned officers) = 1, officers = 2. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

3.2 Effects of Extrinsic and Intrinsic Factors on Mental Health

Table 2 provides the findings from hierarchical multiple regression analyses predicting depression and mental well-being. Each successive regression model showed a significant test statistic and additional contribution to the variance in the mental health outcomes, depression, and mental well-being. More salary satisfaction and more work environment satisfaction were significantly associated with less depression in Step 2. However, in the regression analysis incorporating intrinsic factors (Step 3), salary was no longer significantly related to depression, whereas work environment remained significantly associated with it. In contrast, higher salary satisfaction was robustly related to better mental well-being regardless of the effects of intrinsic factors. Work environment satisfaction was not associated with mental well-being after controlling for the effects of intrinsic factors. Unlike the extrinsic factors, higher levels of perceived calling and positive aspects of military service were both significantly associated with less depression and higher mental well-being, even when the effects of salary satisfaction and work environment satisfaction were adjusted for in Step 3 of the regression models. Among demographic variables, age, sex, and marital status were associated with mental well-being in Step 3, indicating that military personnel who were younger, male, and married had higher levels of mental well-being. To assess the independence of the predictors in all regression models, multicollinearity was examined. The results showed that all Variance Inflation Factor (VIF) values were below 10, indicating that the assumption of multicollinearity was not violated.

Table 2: Hierarchical multiple regressions for mental health (N = 500).

Outcome Variable: Depression									
Predictors	Step 1 (Demographic factors)			Step 2 (Hygiene factors)			Step 3 (Motivators)		
	<i>B</i>	<i>SE</i>	<i>t</i>	<i>B</i>	<i>SE</i>	<i>t</i>	<i>B</i>	<i>SE</i>	<i>t</i>
Age	−0.02	0.04	−0.58	0.01	0.04	0.19	−0.02	0.04	−0.63
Sex	1.38	0.62	2.25*	1.61	0.61	2.67**	1.01	0.58	1.77
Education	−0.53	0.45	−1.18	−0.43	0.44	−0.96	−0.40	0.42	−0.97
Marital status	−0.55	0.57	−0.97	−0.53	0.56	−0.96	0.01	0.52	0.01
Salary	-	-	-	−0.03	0.01	−3.07**	−0.01	0.01	−1.53
Work environment	-	-	-	−0.02	0.01	−2.48*	−0.02	0.01	−2.54*
Calling	-	-	-	-	-	-	−0.06	0.03	−2.33*
Positive appraisals	-	-	-	-	-	-	−0.28	0.05	−6.05***
<i>R</i> ²	0.023, <i>F</i> (4, 495) = 2.87*			0.066, <i>F</i> (6, 493) = 5.79***			0.187, <i>F</i> (8, 491) = 14.14***		
Δ <i>R</i> ²	-			0.043, <i>F</i> (2, 493) = 11.39***			0.121, <i>F</i> (2, 491) = 36.66***		
Outcome Variable: Mental Well-Being									
Predictors	Step 1 (Demographic factors)			Step 2 (Hygiene factors)			Step 3 (Motivators)		
	<i>B</i>	<i>SE</i>	<i>t</i>	<i>B</i>	<i>SE</i>	<i>t</i>	<i>B</i>	<i>SE</i>	<i>t</i>
Age	−0.14	0.12	−1.20	−0.29	0.12	−2.46*	−0.19	0.09	−1.98*
Sex	−6.90	1.92	−3.60***	−7.86	1.86	−4.22***	−4.90	1.47	−3.23**
Education	2.72	1.41	1.94	2.18	1.37	1.60	1.78	1.07	1.66
Marital status	5.69	1.77	3.23**	5.69	1.71	3.33**	3.01	1.35	2.23*
Salary	-	-	-	0.14	0.03	5.06***	0.06	0.02	2.58*
Work environment	-	-	-	0.03	0.03	1.27	0.02	0.02	1.04
Calling	-	-	-	-	-	-	0.73	0.07	10.52***
Positive appraisals	-	-	-	-	-	-	0.87	0.12	7.16***
<i>R</i> ²	0.056, <i>F</i> (4, 495) = 7.36***			0.118, <i>F</i> (6, 493) = 11.03***			0.450, <i>F</i> (8, 491) = 52.12***		
Δ <i>R</i> ²	-			0.062, <i>F</i> (2, 493) = 17.41***			0.341, <i>F</i> (2, 491) = 154.73***		

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Salary = salary satisfaction. Work environment = work environment satisfaction.

Interaction effects between the extrinsic and intrinsic factors are presented in Table 3 and Fig. 1. Interaction effects between salary and the intrinsic factors were found in most of the regression analyses (Model 2, Model 3, and Model 4), except for the analysis regressing depression on salary satisfaction and calling in Model 1. No interaction effects between work environment satisfaction and intrinsic factors were found in this study. Fig. 1 displays the interaction effects found in the regression analyses for Model 2 (Fig. 1A), Model 3 (Fig. 1B), and Model 4 (Fig. 1C). The figure panels illustrate how military personnel with higher levels of calling or positive appraisals showed better mental well-being and lower depression, and these relationships were statistically but marginally amplified among those who were more satisfied with their salary.

Table 3: Interaction effects between hygiene factors and motivators (N = 500).

Outcome Variable	Depression				Mental Well-Being			
	B	SE	t	R^2	B	SE	t	R^2
	Model 1				Model 2			
Salary	−0.02	0.01	−2.60**		0.07	0.02	3.22**	
Calling	−0.15	0.02	−6.06***	0.124***	0.97	0.06	15.55***	0.409***
Salary × Calling	−0.002	0.00	−1.92		0.01	0.00	2.35*	

Table 3: Cont.

Outcome Variable	Depression				Mental Well-Being			
	Model 3				Model 4			
Salary	-0.03	0.01	-2.60**		0.09	0.02	4.00***	
Positive appraisals	-0.36	0.04	-8.52***	0.178***	1.57	0.12	13.37***	0.353***
Salary $\times$ PA	-0.01	0.00	-2.59**		0.02	0.01	3.79***	
	Model 5				Model 6			
Work environment	-0.02	0.01	-3.05**		0.04	0.02	1.80	
Calling	-0.15	0.02	-6.31***	0.122***	0.99	0.06	16.05***	0.392***
Work $\times$ Calling	-0.001	0.00	-1.20		0.001	0.00	0.61	
	Model 7				Model 8			
Work environment	-0.03	0.01	-3.24**		0.06	0.02	2.52*	
Positive appraisals	-0.35	0.04	-8.68***	0.176***	1.57	0.12	13.49***	0.325***
Work $\times$ PA	-0.01	0.00	-1.46		0.01	0.01	1.86	

Note: All models controlled for the effects of age, sex, education, and marital status. PA = positive appraisals of military service, Salary = salary satisfaction, Work = work environment satisfaction. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

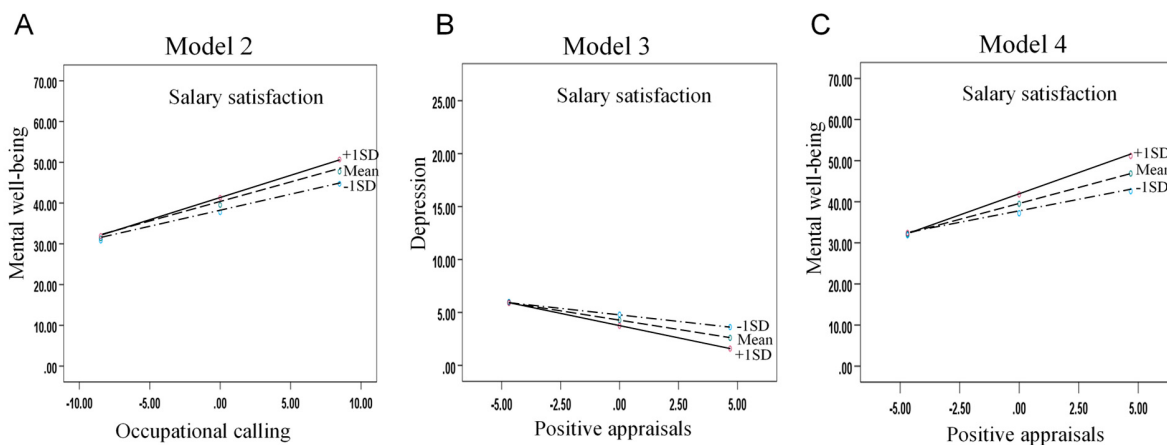


Figure 1: Interaction effects between salary satisfaction and motivators on depression and mental-well-being. (A) Interaction between salary satisfaction and calling on mental well-being (Model 2); (B) Interaction between salary satisfaction and positive appraisals on depression (Model 3); (C) Interaction between salary satisfaction and positive appraisals on mental well-being (Model 4).

4 Discussion

Although extensive research has been conducted to examine the associations between extrinsic and intrinsic factors with work-related performance [26], less attention has been given to their differential and interaction effects in association with mental health outcomes, particularly among military populations. Thus, the present study was designed to ascertain whether extrinsic and intrinsic determinants had distinct and combined effects on depression and mental well-being in a Korean military sample. Consistent with Hypothesis 1, bivariate correlation analysis revealed that both extrinsic and intrinsic factors were significantly and negatively associated with depression, while showing significant positive correlations with mental well-being. Hierarchical multiple regression analyses revealed that greater satisfaction with the work environment was independently associated with lower levels of depression, while salary satisfaction had a differential and positive effect on mental well-being, after controlling for the effects of the two

intrinsic variables. Employees working in adverse environments, such as poor air quality or older buildings, can experience cognitive, psychological, or physiological symptoms associated with sick building syndrome (SBS), which in turn negatively affects mental health [13]. For example, individuals with more SBS symptoms reported higher levels of work-related depression and negative affect [34]. Similarly, the current study found that military personnel who perceived their physical environment as unfavorable reported higher levels of depressive symptoms. Given the potential for depression resulting from poor environmental conditions, particular attention should be directed toward the mental health of service members working in confined spaces, such as bunkers or submarines [35,36]. Unlike the work environment, higher salary satisfaction uniquely predicted mental well-being in the final model. This association may stem from increased work-related enthusiasm and job satisfaction, both of which are related to salary satisfaction and robust indicators of subjective well-being and psychological health [37–39]. Consequently, personnel satisfied with their compensation are more likely to be engaged and maintain a positive attitude, fostering higher overall well-being.

On the other hand, both intrinsic variables had significant associations with depression and mental well-being, even after controlling for the effects of extrinsic variables in this sample. According to the self-determination framework, the need for autonomy is an essential determinant for personal well-being [21]. Research based on this theoretical framework indicates that individuals possessing a profound sense of calling are more likely to engage in their work through autonomous motivation and derive significant meaning from their professional roles, which subsequently enhances subjective well-being [40]. Although autonomy may be constrained in the military due to its hierarchical culture, a greater sense of calling to service may serve as a critical resource for the mental health of service members. Several empirical studies have demonstrated that meaning in work and income can be predictors of a sense of calling [41]. Thus, military leadership or policy interventions should focus on enhancing levels of occupational calling by fostering an environment in which service members can actively engage in their duties and find value and meaning during their service. Furthermore, the positive correlation between salary satisfaction and occupational calling suggests that adequate financial support may foster a sense of calling among military personnel.

Positive cognitive appraisal is also a well-known protective factor for mental health, especially when individuals are exposed to adversity or stress [42]. Given that military duty involves potential sacrifice and exposes personnel to stressful events, perceiving the positive aspects of military service can alleviate negative emotions or enhance mental well-being. The relationship between positive appraisals and mental health may be explained through appraisal theory and broaden-and-build theory. Within this theoretical context, emotions can be elicited through the appraisal of circumstances, and positive emotions serve adaptive motivational functioning [43]. The broaden-and-build theory also emphasizes that positive emotions are not merely components of optimal well-being, but also function as promoting factors for physical and psychological well-being [44]. Thus, military personnel who appraise their service in a positive light are more likely to experience positive emotions, which can evoke adaptive intrinsic motivation and contribute to positive mental health outcomes.

Another key findings of this study is that Hypothesis 2 was partially supported. While no significant interaction effects were found for work environment satisfaction, salary satisfaction was found to marginally amplify the impact of intrinsic factors on both depression and mental well-being. As shown in Fig. 1, increases in calling or positive appraisals were associated with higher levels of well-being and lower levels of depression, and the positive effects were amplified when satisfaction with salary was high. These findings are partially consistent with a meta-analysis, which demonstrated that both extrinsic incentives and

intrinsic motivation contributed to performance [26]. Although some studies have shown an “undermining effect”, suggesting that external rewards can diminish intrinsic motivation [45], subjective satisfaction with salary was found to strengthen the positive effects of intrinsic factors on mental health outcomes in this sample. On the other hand, interaction effects of work environment satisfaction were not found in this sample. This discrepancy may arise from the differing nature of the two extrinsic factors. While salary functions as a versatile resource that facilitates self-development and leisure activities, thereby positively influencing mental health in conjunction with positive appraisals, the work environment may primarily be perceived as a baseline physical necessity. Consequently, the physical environment may offer less potential for synergistic interaction with an individual’s internal psychological resources compared to the flexible nature of financial compensation.

This study has several limitations that should be noted. First, a major limitation of a cross-sectional research design is its inability to establish causal relationships between variables. Although this study provided evidence for the differential and synergistic effects of two extrinsic components and two intrinsic variables on mental health outcomes, further research is needed to understand how these relationships evolve over time using longitudinal data. Second, the findings of this study are based on Korean Army officers and NCOs, which may limit their generalizability to other military populations, such as enlisted soldiers or officers from other countries. The gender imbalance in the sample (87.2% male vs. 12.8% female) represents a potential limitation. However, as female personnel comprise approximately 11% of the South Korean military, this distribution closely aligns with the actual population ratio. Despite this representative sampling, correlation analyses indicated that female service members reported higher levels of depression and lower mental well-being than their male counterparts. Therefore, more research utilizing a larger sample of female personnel is needed to identify unique risk and protective factors for their mental health. Third, extrinsic and intrinsic factors affecting mental health can include the welfare system [46] and psychosocial factors such as self-efficacy [47], which were not considered in this study. In addition, the determinants utilized in the current study were predominantly protective variables, which may have overlooked the influence of risk factors on mental health outcomes. For example, stress or traumatic experiences have been widely examined as adverse determinants of depression or mental well-being among military samples [48,49]. Thus, future research should take both risk and protective factors into account to better understand which factors are associated with the mental health of service members and how they are related. Another limitation pertaining to the variables is the operationalization of the ‘work environment’ variable. The work environment measure utilized in this study may potentially encompass not only physical conditions but also interpersonal relationships within the office. To be strictly assessed as an extrinsic factor, the variable needs to be more clearly operationalized (e.g., as ‘physical work environment’) in future studies. Finally, the current study focused on examining the effects of predictors on outcome variables from a variable-centered perspective, despite the possibility that individuals may exhibit different combinations of extrinsic and intrinsic motivations. For example, some participants may have both high occupational calling and salary satisfaction, while others may display high occupational calling but low salary satisfaction. Thus, further research using a person-centered approach, such as latent profile analysis [50], may provide a different perspective on how extrinsic and intrinsic factors are grouped and how these patterns are associated with mental health outcomes.

5 Conclusions

This study demonstrates that protecting the mental health of Korean military personnel requires a comprehensive approach that simultaneously addresses both extrinsic and intrinsic determinants. Extrinsic

factors, such as salary and work environment satisfaction, can serve as a foundation in promoting well-being and reducing depressive symptoms. However, intrinsic resources including occupational calling and positive appraisals of military service emerged as more robust and consistent predictors of overall psychological health. These findings suggest that an internal sense of purpose and a positive subjective interpretation of one's service are more pivotal than material rewards alone in mental health of officers and NCOs. Thus, military leaders and mental health professionals should focus on more holistic strategy that cultivates the internal resilience of service members. Leadership interventions should prioritize fostering an organizational culture that enhances occupational calling by helping personnel find profound meaning and value in their unique roles. Likewise, mental health experts should develop programs that encourage positive cognitive appraisals of military life, helping service members recognize the personal growth and social contributions inherent in their service. Strengthening these internal motivators is essential for building a psychologically resilient force capable of enduring the inherent stressors of a professional military career.

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