

A Cross-Level Study of the Consequences of Work Stress in Police Officers: Using Transformational Leadership and Group Member Interactions as an Example

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Purpose: The objective of this study was to investigate the effect of work stress on job burnout and quality of life and the effect of moderating group factors (transformational leadership and group member interactions) on the relationship between work stress, job burnout, and quality of life. This study takes front-line border police as the research object, adopts a cross-level perspective, and takes work stress as a key factor affecting work efficiency and health indicators.

Methods: It collected data through questionnaires, with questionnaires for each research variable adapted from existing research scales, such as multifactor leadership questionnaire developed by Bass and Avolio. A total of 361 questionnaires were filled out and collected in this study, including 315 male participants and 46 female participants. The average age of the participants was 39.52. Hierarchical linear modeling (HLM) was used to test the hypotheses.

Results: First, it was found that work stress has a significant impact on job burnout and quality of life. Secondly, leadership style and group member interactions have a direct, cross-level effect on work stress. Third, it found that leadership style and group member interactions have an indirect, cross-level effect on the relationship between work stress and job burnout. However, these are not indicative of quality of life. The results of this study highlight the particular impact of the nature of police work on the quality of life, and further enhance the value of this study.

Conclusion: The two major contributions of this study are: 1) it shows the original characteristics of the organizational environment and the social context of Taiwan's border police and, 2) in terms of the research implication, it is necessary to re-examine the cross-level impact of group factors on individual work stress.

Keywords: work stress, transformational leadership, job burnout, quality of life

Introduction, Literature Review and Hypotheses Development

Introduction

Work stress may have positive and negative effects depending on the person or the magnitude of the pressure. However, from Taiwan's perspectives, many studies showed that work stress has negative effects in somehow and suggested that work stress had a direct impact on employees' perception of negative stress, which eventually affected an individual's work productivity and workplace health.¹ It's believed that the negative effect of work stress can be alleviated. Several researchers have shown that many group factors would function as a buffer, and moreover, there was a linkage effect between these group factors. For instance, Chauhan et al,² revealed that numerous leadership behaviors of managers could reduce the negative effect of work stress on employees' work effectiveness.

The subjects of this study are Taiwan's front-line border police officers. With the surge in the number of people entering and leaving the country and the increase in people's awareness of national defense, the responsibilities of the

border police have increased, but the police force has not increased accordingly. For front-line police officers, it means an increase in their workload. Moreover, border police are responsible for cracking down on border crimes, which makes their work challenging, full of temptation, and dangerous. Last, border police need to work shift or 24-hour on-call, it is difficult to develop a regular schedule, and they are susceptible to work pressure, affect work efficiency and damage health.³ For example, Garbarino et al,⁴ found that work-related stress (such as acute versus chronic stress) may play an important role in the development of police psychological health problems. A study by Garbarino et al⁵ also found that the shift nature of police work leads to long-term poor sleep quality and health problems, which can reduce well-being, work performance, productivity and safety. Based on the foregoing, many negative effects of work stress were reflected in health indicators^{6,7}, such as a decline in quality of life and an increase in job burnout.⁸

Taken together, front-line border police are under a lot of work stress, which is a reaction that is triggered in individuals when they feel threatened by certain work characteristics in the workplace. Generally, work stress included stimulation, interactions, and response.¹ In terms of stimulation, job factors are a major source of employees' work stress. For the response part, the negative effect of work stress was primarily manifested in employees' effectiveness and health indicators.¹ The effectiveness indicators were multi-faceted, and some examples are job burnout, work effectiveness, and organizational commitment. Job burnout has an adverse effect on employees in various ways, including lowering their service quality and/or diminishing their passion for work.⁹ Because the three main work areas of border police are international airport or port security, traffic control, and civil service, it is important to investigate the job burnout of border police officers caused by work stress. However, research on border police in this area is rare, especially during the years when COVID-19 was prevalent, and the risk of COVID-19 infection while on duty increases significantly.^{10,11} Therefore, it is particularly important to explore the stress of their work and its impact. This study treated job burnout as not only an outcome indicator of police suffering from work stress, but also as a representing factor for testing effectiveness indicators. Apart from work stress, shift workers lack a daily routine, have difficulty concentrating, and can lead to emotional instability, which would end up compromising their interpersonal relationship as well as physical and mental health, family life, and social functions.¹²⁻¹⁴ Therefore, it is crucial to examine the quality of life of border police officers. Tripathi¹⁵ pointed out that quality of life was associated with an individual's level of satisfaction with his or her life. In this case, inconveniences caused by shift work may affect shift workers' satisfaction with life and influence not only their mental and physical health overall, but also eventually their work quality and safety.¹⁶ For border police, work stress induced by shift work for sure had an impact on their quality of life.³ The impact of the stress of work on the quality of life of border police is considered crucial. Therefore, this study lists job burnout and quality of life as the outcome factors of work stress and representative factors of health indicators.

As for interactions, this study treated group factors as a modulator in the cause-effect relation of work stress because they direct the effect of work factors on employees' perception of work stress and, subsequently, the employees' response. A group consists of more than one individual, and generally, interactions in a group involve leadership style and group members with these two issues. Kao & Cheng¹ pointed out that it is important to take the role shaping effect of groups on group members into consideration. Furthermore, leaders can reduce the tension, anxiety, unfriendliness, and prejudice among group members by promoting good interactions among the members. Leaders can also lower the negative pressure experienced by their group members through social support.¹⁷⁻¹⁹

In summary, this study treated transformational leadership and group member interactions as group factors interacting with work stress. Both factors are tested as a moderating variable of study subjects' interaction with work stress. Although a variety of individual and group factors have been involved in reducing the negative emotions associated with stress and the negative effects of work stress, it is important to note that this study focused on the work stress of the study subjects, and because police officers have similarities to the military in organizations, group factors have a greater impact on police work stress than individual factors.¹⁶ For example, group factors like leadership style and group member interactions can work through selection of employees, training for management, and establishment of a good communication model and support system to reduce front-line workers' work stress. The scope of this study was limited to group-level factors, hence personal-level factors were not explored.

Past studies, especially in Taiwan, have had research gaps that have rarely addressed the stress of border police work. Especially during COVID-19, discussions about the stress of border police work and its consequences have come to an

end. This study explores the impact of cross-level leadership style and interaction on work stress on burnout and quality of life of border police by using group factors to explore the existing research gaps, and also opens up new research horizons.

Literature Review and Hypotheses Development

Work stress is an adverse or coercive phenomenon generated by certain factors in the work environment on workers. This feeling occurs when an individual in a state of coercion is unable to eliminate the threat and is therefore in trouble.²⁰ In other words, work stress is a dynamic process that arises when an individual assesses and recognizes a gap between the work requirement and the resources to be properly handled.²¹

Association Between Work Stress, Job Burnout, and Quality of Life

Work stress has usually been described in purely negative terms. Researchers suggest that work stress is affected by work factors, group factors, organizational factors, and personal factors. Those factors not only directly act on employees' negative stress experience, but also ultimately have an impact on an individual's work effectiveness and workplace health in terms of, for example, job burnout^{14,22} and quality of life.^{23,24}

Among all theories of possible consequences of work stress, French and Kahn²⁵ was the first to apply the above concept in the organization domain and proposed the social environment model. This model, based on Lewin's²⁶ interactive perspective, claims that if an individual fails to meet the objective requirements in the environment, his / her behavior and health will be affected. Second, Caplan et al²⁷ suggested the person-environment fit theory. The main idea is that stress occurs when the outcome of a job does not match the needs, motivations, or preferences of a worker, or when a worker's abilities or skills do not meet the requirements of the job. In other words, stress can be caused by job characteristics, work environment, roles, and interpersonal issues. When an individual's need or capability does not match the source or requirements of these factors, mental strain may occur, making the person nervous, depressed, or mentally exhausted.^{28–30} Work stress can also reduce employees' work effectiveness.³¹ Ivancevich and Matteson³² proposed an integrated model of work stress, which emphasizes that internal and external stressors of an organization increase physiological and behavioral stress at work, career, and life, and ultimately lead to adjustment disorders. According to the social exchange theory, Siegrist³³ suggested the effort-reward imbalance model, which includes two key concepts: 1) work effort and 2) work reward. Siegrist believed that effort and reward should be balanced and reasonable in the social exchange process, and stress is the product of an imbalance between a high effort but a low reward. Based on this model, a high effort but low reward condition or overwork is capable of causing harm to one's health; can make an individual nervous and cause illness.¹

In studies on Burnout in Taiwan: A Critical Review, a meta-analysis study, Hung³⁴ summarized all relevant research and pointed out that the most certain antecedent of job burnout is work stress, which is consistent with previous findings and theories. For example, Yang et al³ pointed out that work stress is a direct factor affecting job burnout, and found that the negative relationship between those two can be alleviated through social support. Job burnout can be viewed as a physical and mental exhaustion of resources from an individual because of his/her inability to cope with the pressure and frustration associated with interaction at the workplace. In this case, the individual will retreat and treat people around with indifference and mockery. Also, the individual's sense of achievement at work will be negatively influenced.³⁵ Theoretically, job burnout is an extension or consequence of an individual suffering from chronic work stress.^{36,37} Among 130 quantitative, empirical studies, many demonstrated that work stress has an effect on job burnout.^{38,39} Coping behavior and strategies are a work stress variable. Studies have shown that coping behavior has a negative effect on job burnout. If coping strategies can be classified into active coping and passive coping, then it is active coping strategies that are negatively correlated with job burnout.⁴⁰ As for passive coping strategies, they are positively correlated with job burnout.⁴¹

As a result, work stress may affect employee productivity and health indicators. For example, Klein et al⁴² indicated that burnout is the result of the accumulation of stressors. While each stressor alone may be relatively insignificant, their cumulative impact may exceed a person's resources and negatively impact work through job burnout. If a civil servant simultaneously faces various conflicts related to his/her roles or experiences interpersonal disputes at the workplace, then this individual, as he is also constantly under above mentioned stressors, will experience job burnout.⁴³ Ferrans⁴⁴ suggested that

the inconvenience caused by shift work may affect shift workers' physical and mental health. It will eventually reduce their quality of life. Researchers also indicated that long-term shift workers may have a hard time adjusting their biological clock and are prone to mental fatigue, which, in return, will affect their overall quality of life.^{3,45} According to studies worldwide, researchers are of the opinion that the work stress of border police may affect police officers' perception of job burnout and reduce their quality of life. Therefore, two hypotheses were tested by this study.

H1a: Work stress significantly contributes to Job burnout.

H1b: Work stress significantly and negatively contributes to quality of life.

Group-Level Variables' Direct Cross-Level Effect on Work Stress

As mentioned earlier in the previous introduction, most studies agree that work stress is negative. Nevertheless, group factors can provide a buffer against the negative effect of work stress, and in fact, an effective moderating effect of group factors, such as transformational leadership⁴⁶ and group member interactions,⁴⁷ not only improves employees' physical as well as mental health,¹ but also reduces job burnout.³⁷

Among numerous leadership studies, Brass and Avolio⁴⁸ indicated that transformational leadership, including charismatic leadership, emphasizes that leadership behavior is symbolic, evokes subordinates' emotions and inspires high motivation.⁴⁹ In this study, transformational leadership is defined as a group-level variable instead of a traditional individual-level variable. In other words, how each member perceives the manager's transformational leadership is aggregated into group-level transformational leadership called aggregated transformational leadership. Transformational leaders use the opportunities of public occasions and regular discussion to show the department's vision as well as the importance of completing tasks assigned by the organization.⁵⁰ At the same time, these leaders also inspire their employees to be enthusiastic, energetic, and willing to work hard.^{51,52} As a consequence, the organizational goal is jointly achieved by employees. When employees are confident about realizing their team's vision, their job performance improves,⁵³ and they feel less work stress.¹⁶ Therefore, if managers demonstrate appropriate leadership, such as reinforcing beliefs of self-actualization and subsequently setting goals for self-management, then they can help subordinates to realize their potentials. At the same time, their self-effectiveness will get better, making them ready to excel.⁵⁴ As mentioned earlier, a manager's leadership style can reduce the pressure on subordinates. In addition, transformational leaders use encouragement or persuasion to cheer up subordinates and to provide intellectual stimulation, which can strengthen subordinates' confidence about accomplishing their tasks. Parveen and Adeinat¹⁸ revealed that employees whose managers demonstrated a more transformational leadership style usually experienced lower work stress. As a result, this study hypothesized that employees' work stress can be effectively reduced when all group members find their manager's transformational leadership inspiring and that their manager care about them. Therefore, in this study, it was considered that when group members collectively recognize their manager's transformational leadership style, aggregated transformational leadership will be formed. It will have a cross-level effect on individual employee's sense of work stress.

On the other hand, LePine et al⁵⁵ pointed out that group member interactions can be interpreted as positive interactions between individuals and their group, creating a mutual environment that promotes communication, altruism, group loyalty, and respect other group members. The outcome of group interactions is manifested by the mutual trust among group members that facilitates good group interactions.⁵⁶ Although researchers have reached no consensus on the classification of group processes, most of them do agree that group processes should be limited to interactions among group members or at the workplace.⁵⁷ They also suggested that these interactions should include at least communication and collaboration using these two main processes.⁵⁸ Communication here refers to the process exchanging information between members, while collaboration refers to members helping and supporting each other to accomplish a task.¹

The above theories and studies showed that organizations can reduce the negative response of work stress through group member interactions. People are part of a group, and basically, good interactions minimize tension, anxiety, unfriendliness and prejudice in a group. That is, when there is good communication between group members, but also social support, people feel less negative pressure and members show more trust and participation.⁵⁹ In addition, these employees will be more positive mentally and behaviorally.⁶⁰ Conversely, poor interactions can lead to increased stress at work.¹ This study therefore proposed the following hypotheses on the direct cross-level effect.

H2a: Aggregated transformational leadership has positive effect on work stress.

H2b: Group member interactions have positive effect on work stress.

Indirect Cross-Level Effect of Group Factors on the Association Between Work Stress, Job Burnout, and Quality of Life

Previous studies have shown that when members interact appropriately and support each other, their work effectiveness and health indicators will improve. On the other hand, if there is lack of interaction or support, their productivity and health improve.⁶¹ Secondly, when relationships between colleagues are not ideal, employees' job satisfaction decreases and they show negative stress responses.⁶² Third, good interactions reduce group tension, anxiety, unfriendliness, and prejudice. That is, when members communicate well and receive social support, they feel less negative stress, show more trust, and become more engaged.⁵⁹ At the same time, they will be mentally and behaviorally more positive.⁶⁰ However, if there is lack of communication or social support, negative stress increases for employees, which reduces their quality of life.⁴⁵ Therefore, in addition to alleviating work stress directly, the factor of leader-subordinate interactions may also have a health-promoting effect⁶³ and a quality of life-promoting effect¹⁶ via reducing the level of stress perceived by an individual through communication and mutual support. For example, Wang et al⁶⁴ a meta-analysis study, revealed that with the encouragement of managers and the support of colleagues, individuals' quality of life improves. This study also found that members supporting each other through communication and trust have different effects on job burnout. First, a study has shown that support from colleagues had a direct negative effect on burnout.⁶⁵ Secondly, studies have demonstrating that a support system based on member interactions modulates the association between other variables and job burnout.¹ Last, Naidoo⁶⁶ discovered that management support alleviates the negative impact of work stress on employees' work effectiveness. Therefore, this study proposed the following hypotheses on the direct and indirect cross-level effects.

H3a: Aggregated transformational leadership reduces the positive impact of work stress on job burnout.

H3b: Group member interactions reduce the positive impact of work stress on job burnout.

H4a: Aggregated transformational leadership reduces the negative impact of work stress on job burnout.

H4b: Group member interactions reduce the negative impact of work stress on quality of life.

Materials and Methods

Research Framework

This study investigated the outcome of work stress in Taiwan's border police and the moderating association between transformational leadership and group member interactions. The research framework is shown in [Figure 1](#).

Participants

This study focuses on Taiwan's front-line border police as the research object. Based on the cross-level issues, this research must consider group-level sampling. In addition, this study refers to the cluster sampling approach adopted by Kao,¹⁶ and based on human and financial constraints during sampling, stratified sampling was used first, followed by quota sampling based on the selected units when collecting data. Moreover, in order to ensure reliable group-level data and high-quality data, the following sampling criteria were set for the sampling of the research subjects: 1) Respondents should have worked in their department for more than six months to ensure that respondents have a specific understanding of the research variables; 2) Each department should have at least 10 employees (excluding supervisors and deputy supervisors). To stay focused and to minimize differences in job characteristics between different border police departments, this study chose front-line police officers from the police stations of Taiwan's Aviation Police Bureau located in various airports and from the squadrons of Harbor Police Office at various ports to be the participants. These two departments are hierarchically similar. Although some border police officers work in an airport while others work in a port, their job descriptions are similar. The primary duties of these front-line police officers are to maintain the security at international airports and ports, provide services to passengers entering and leaving Taiwan, and conduct traffic control.

Furthermore, in order to make the sample to effectively representative of the population, this study adopted a stratified two-stage sampling design, and was based on the principle of probability proportional to size (PPS) sampling.⁶⁷ According to the current organizational structure of the Taiwan Border Police, the first layer of sampling was based on the Taipei and Kaohsiung branches of Taiwan's Aviation Police Bureau, and according to the geographical location

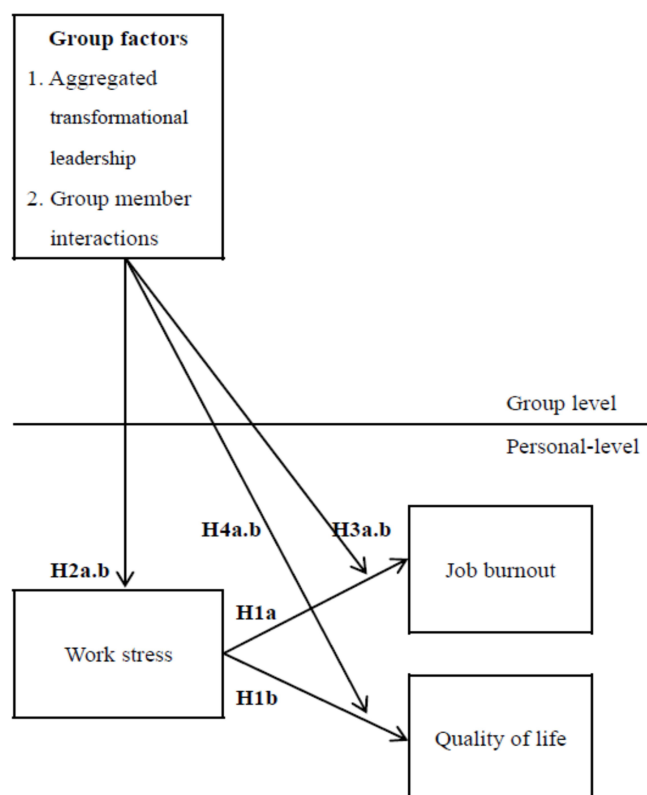


Figure 1 The research framework.

and size of the sampled aviation police bureaus, two Harbor Police Departments, Keelung and Kaohsiung (two authorities each at the airport and at the port), were selected. In the second layer of sampling, this study selected two units from the selected precinct or the Harbor Police Department, a total of eight units (four units from the airport and four units from the port), and the probability of each unit being selected was the same. This study collected data through questionnaires. According to the sampling procedures and methods, a total of 361 valid questionnaires were obtained in this study. Based on the rigorous procedures described above, the information collected in this research should be sufficiently representative. In addition, this research has been reviewed and approved by an academic institution in Taiwan before proceeding. Informed consent was provided during the questionnaire interview, and the respondents also signed the consent form.

Measurements

This study is mainly based on questionnaires, and most of the questionnaires refer to the existing literature of European and American researchers. Therefore, when translating these scales, this study followed the suggestion of Brislin.⁶⁸ That is, in order to ensure the accuracy of the translated information, the scale was first translated into Chinese by native English speakers, and then back into English to ensure that there are no semantic differences in the Chinese scale.⁶⁷ This study used a 5-point Likert scale (strongly agree, agree, neutral, disagree, and strongly disagree) to assess participants' perception of the study variables.

The items for work stress were taken from the studies of effort-reward-imbalance model by Siegrist and Peter.⁶⁹ The items for job burnout were taken from the studies of Burnout Inventory-General Survey [MBI-GS] by Maslach.⁷⁰ The items for quality of life were taken from the studies of Organization Quality of Life Questionnaire [WHOQOL] by Yao.⁷¹ There were 28 questions; 26 of them were from the original global WHOQOL, and the other two were region-specific questions. The total score of the study subjects was used to determine the quality of life; a higher score means a better quality of life. The items for transformational leadership were taken from the studies of the multifactor leadership

questionnaire [MLQ] by Brass and Avolio.⁴⁸ The items for group member interactions have been taken from the studies of the Group Member Interaction Questionnaire by Kao.¹⁶ In addition, the research scale of Kao,¹⁶ was based on the organizational behavior of the front-line immigration officers of the Taiwan Immigration Administration. In this study, group member interaction, similar to transformational leadership, was defined as a group variable, and therefore, when examining these two variables, each member's score was added up and averaged for each department. The average of each department of these two variables was treated as the study participant's perception score of the group variables. All of the aforementioned scales were modified based on the job characteristics of Taiwan's border police. The scale structure and number of items for each study variable are detailed in [Annex 1](#).

Moreover, among the control variables, age, education, and seniority are currently known to be critical factors affecting study participants' perception of group variables.^{22,72} As a result, this study treated these three factors as control variables when assessing the relationships between these variables at each level. Furthermore, the number of group members is known to be a variable affecting members' perception of group-level variables.³ Therefore, group size was treated as a group-level control variable.

Analysis Strategy

This study first performed confirmatory factor analysis (CFA) to demonstrate that work stress, job burnout, and quality of life at the personal level, can be viewed as independent constructs. Second, to assess group-level characteristics, this study adopted the approach presented in Klein and Kozlowski,⁷³ for assessing the within-group consistency (ie, whether members in the same department, such as the police station of Aviation Police Bureau at Kinmen, share a similar perspective about group-level variables). Furthermore, eta-squared (η^2) in ANOVA and intraclass correlation coefficient (ICC) of HLM were applied to assess differences between organizations to validate variation in organization-level characteristics.¹⁶ Next, HLM was adopted to examine the direct and indirect cross-level effect of group-level variables. In this study, HLM was used to evaluate the cross-level associations among group- and personal-level variables. Lastly, hierarchical regression modeling was applied to test the relations among personal-level variables.

Results

Basic Information on Respondents and Study Variables

This study had a total of 361 questionnaires filled and returned, 315 of them by male participants and 46 of them by female participants. Female participants accounted for 12.74% of the total participants, and this percentage is similar to the percentage of female police officers (12.32%) in Taiwan by the end of 2020. The average age of the participants was 39.52. Most of the participants graduated from Taiwan Police College (TPC, 67.31%); the remaining were university graduates (32.69%). The ratio between TPC graduates and non-TPC graduates in this study also reflects the type of education presently available for police officers in Taiwan. Last, the average years of seniority of this study's police participants was 15.21 years, while the average years of seniority of border police was 8.46 years. The average number of participants from each police department was 26. According to the years of the police participants serving in the current department (vs the number of years serving in police forces in general), most study participants had served as border police long enough for the scores of study variables to reflect the current condition of border police.

[Table 1](#) shows the mean, standard deviation, Cronbach α , and correlation coefficient among research variables. To examine if work stress, job burnout and quality of life are heterogeneous latent constructs, the CFA was conducted to compare these three heterogeneous constructs using the LISREL maximum likelihood method. From the CFA results shown in [Table 2](#), it can be seen from [Table 2](#) that the χ^2/df of each research variable at the individual level is less than 5,⁷⁴ GFI and NNFI are both greater than 0.8,^{75,76} and PGFI is greater than/equal to 0.5,⁷⁵ and RMSEA less than/equal to 0.08.⁷⁷ It is clear that work stress, job burnout and quality of life are three heterogeneous latent constructs. In addition, this research implemented the HLM analysis using the SPSS for Windows 22.

Table 1 Descriptive Statistics, Correlation Coefficient, and Alpha Coefficient

	M	SD	α Coefficient	Research Variables				
				(1)	(2)	(3)	(4)	(5)
(1) Work stress	3.075	0.401	0.745	I				
(2) Job burnout	3.152	0.415	0.802	0.272**	I			
(3) Quality of life	3.22	0.355	0.798	−0.301***	−0.085	I		
(4) Transformational leadership	3.752	0.435	0.837	−0.273**	−0.106	0.087	I	
(5) Group member interaction	3.843	0.387	0.891	−0.249**	−0.122	0.921	0.524***	I

Notes: (1)–(3) = individual-level research variables; (4)–(5) = group-level research variables. ** $p < 0.01$; *** $p < 0.001$.

Testing of Aggregated Data

Regarding aggregation data examinations, James⁷⁸ recommended examining member score consistency with intra-class correlations (ICCs), where ICC (1) reflected that the score of members in the same team was consistent. According to Bliese,⁷⁹ the criteria for ICC (1) were 0.05–0.30. The ICC (1) of transformational leadership was 0.15, and group member interaction was 0.19. Therefore, ICC (1) was significant. In addition, the group effect F-value of transformational leadership and group member interaction were also significant (transformational leadership $\eta^2 = 0.245$, $F = 3.03$, $p < 0.001$; group member interaction $\eta^2 = 0.307$, $F = 4.82$, $p < 0.001$). To further prove the suitability of aggregation, this research also calculated the r_{wg} average of transformational leadership: 0.84, and group member interaction: 0.90. The r_{wg} of this variable complied with the 0.70 criterion recommended by James et al.⁸⁰ These aggregate statistics suggested that this research could implement group level study by aggregating individual level data.

Test Results of Individual Level Variables

In this study, the influences of control variables on both individual level and group level variables were examined using hierarchical regression analysis. In group level control variables, Table 3 shows that group scale negatively affects transformational leadership and group member interaction. In individual level control variables, Table 3 shows that age, education level and years of service at the current unit have no significant influence on job burnout, but education level and years of service at the current unit significantly influence quality of life. Moreover, as shown by the results in Table 3, it can be seen that model 4's work stress reached a significant level ($\beta = 0.291$, $p < 0.05$), with a post-adjustment R^2 of 0.169 and the F-value ($p < 0.01$) was significant, demonstrating that work stress has a strong explanatory power on job burnout; hence, H1a is supported. In model 6, the effect of work stress on quality of life was significant ($\beta = -0.247$, $p < 0.05$). After adjustment, $R^2 = 0.199$ and the F-value ($p < 0.05$) was significant, suggesting that work stress has very strong explanatory power on quality of life. Therefore, H1b is supported.

HLM Testing

The Null Model

Examine the correlation between individual and group variables and the correlation between burnout and borderline quality of life Police significant, this study constructed an HLM null model for explanatory variables to verify whether there are significant differences between border police stations (companies). As shown in Table 4, the variance (job burnout and quality of life) significance among groups is above zero ($\tau_{00} = 0.114$, Wald $Z = 3.271$, $p < 0.001$; $\tau_{00} = 0.098$, Wald $Z = 2.84$, $p < 0.001$), suggesting that the employee job burnout and quality of life of individual border police stations (companies) is different.

Contextual Effects (Intercepts-as-Outcomes Models)

To explain the intercept variance at level 1, in this research, individual work stress was tested using the intercept of HLM as the outcome model, and team-level transformational leadership and team member interactions were used as explanatory variables for level 2. H2 predicts that group level transformational leadership and group member interaction will positively affect individual level work stress. Parameter γ_{01} was applied to estimate significance and test if group level

Table 2 Goodness of Fit Indicators for Individual-Level Variables

Research Variable	χ^2/df		GFI		NNFI		PGFI		RMSEA	
	Observed Value	Ideal Value	Observed Value	Ideal Value	Observed Value	Ideal Value	Observed Value	Ideal Value	Observed Value	Ideal Value
(1) Work stress	2.87	1.00~5.00	0.93	>0.8	0.93	>0.8	0.70	>0.5	0.064	<0.08
(2) Job burnout	3.48		0.92		0.91		0.64		0.070	
(3) Quality of life	2.75		0.94		0.94		0.72		0.062	
(4) Transformational leadership	3.98		0.91		0.91		0.59		0.076	
(5) Group member interaction	4.09		0.90		0.90		0.56		0.078	

Table 3 Hierarchical Regression Analysis

Model Independent Variables (Group-Level)	Model Number					
	1	2	3	4	5	6
Group size (control variables)	−0.289**	−0.341**				
Transformational leadership (independent variable)						
Group member interaction (independent variable)						
F	3.323*	4.335**				
Adj. R ²	0.117	0.203				
Model Independent variables (individual-level control variables)						
Age			−0.027	−0.041	0.101	0.088
Education level			0.042	0.036	0.219*	0.146
Years of service			−0.049	−0.053	0.196*	0.121
Work stress				0.291*		−0.247*
F			1.005	3.011**	1.245	3.395*
Adj. R ²			0.003	0.169	0.148	0.199

Notes: Dependent variable: Model 1, for Transformational leadership; Model 2, for Group member interaction; Model 3, 4 for job burnout; Model 5, 6 for quality of life.
 * $p < 0.05$; ** $p < 0.01$.

Table 4 Hierarchical Linear Modeling Results for Individual Variables

Variable		γ_{01}	τ_{00}	γ_{11}
1. The null model	Job burnout		0.114***	
	Quality of life		0.098***	
2. Context effects (intercepts-as-outcomes model)				
Transformational leadership–Work stress		−0.232(0.193)*		
Group member interaction–Work stress		−0.207(0.145)*		
3. Moderating effects (slopes-as-outcomes model)				
Transformational leadership (Work stress–Job burnout)				−0.208(0.182)*
Group member interaction (Work stress–Job burnout)				−0.197(0.132)***
Transformational leadership (Work stress–Quality of life)				0.049(0.098)
Group member interaction (Work stress–Quality of life)				0.057(0.107)

Notes: The numbers in bracket are standard error; 2) It is shown the contextual effect of group-level variable on individual-level variable. For example, transformational leadership–work stress is the contextual effect of group-level transformational leadership on the individual-level work stress. 3) It is shown the moderating effect of group-level variables on the relationship between individual-level independent variable and the dependent variable. For example, group-level transformational leadership moderates the relationship between the individual-level independent variables (work stress) and the dependent variable (job burnout). This table itemizes the indicators for tested hypotheses only. * $p < 0.05$; *** $p < 0.001$.

variables have contextual effect on group level variables. Table 4 shows that transformational leadership and group member interaction have cross-level effect on work stress ($\gamma_{01} = -0.232$, SE = 0.193, $t = 4.75$, $p < 0.001$; $\gamma_{01} = -0.207$, SE = 0.145, $t = 4.12$, $p < 0.001$). Therefore, H2a and H2b are supported. According to the contextual effect, under a multi-level organization framework, group level variables will affect individual level outcome variables, that is, in border police stations (companies), an individual perceiving higher transformational leadership or group member interaction will experience lower work stress.

Moderating Effects (Slopes-as-Outcomes Model)

This research examined H3a.b and H4a.b with the slopes-as-outcomes model. From the results presented in Table 4, the slope of transformational leadership and group member interaction between work stress and job burnout are significant ($\gamma_{11} = -0.208$; $t = 2.12$, $p < 0.05$; $\gamma_{11} = -0.197$; $t = 2.01$, $p < 0.05$). Therefore, H3a and H3b are supported. This result suggests that with group level explanatory variable, transformational leadership or group member interaction have significant effect on individual level job burnout. Moreover, the slope of transformational leadership and group member

interaction between work stress and quality of life are significant ($\gamma_{11} = 0.049$; $t = 0.96$, $p > 0.05$; $\gamma_{11} = 0.057$; $t = 1.12$, $p > 0.05$). Therefore, H4a and H4b are not supported.

Discussion

The purpose of this study is to explore the work stress and evaluate the effect of work stress on the productivity and health indicators of Taiwan's border police. HLM was used to analyze the direct and indirect effects of group-level factors (transformational leadership and group member interactions). The following findings were recorded. The hierarchical regression analysis result showed that work stress has a negative effect on police officers' job burnouts and quality of life, which is similar to the findings of other studies.^{14,24} Second, HLM analysis revealed that transformational leadership and group member interactions between these two group factors, both had a cross-level contextual effect on work stress, and a cross-level moderating effect on the relationship between work stress and job burnout. However, the above is not true for quality of life. This result suggests that transformational leadership or group member interaction has no significant effect on quality of life at the individual level, despite the use of group-level explanatory variables. This research finding is different from the hypothesis of this study, and from previous theories and research findings that group interaction factors may improve the quality of life of individual employees by reducing stress levels at work.^{81,82} What is the reason? From the perspective of the characteristics of the police organization, in police groups similar to military organizations, the efficiency in job execution and task completion are the most important aspects of police organizations.⁸³ Therefore, the supervisor's leadership style and the interaction between group members are also more likely to play a weakened moderating role between job stress and job burnout. Conversely, the nature of 24-hour shift work by frontline police officers means that they may not have the time and energy to participate in private activities between team members, such as dinners or outdoor activities, and their quality of life will be affected.⁸⁴ And as a result, the supervisor's leadership style and the interaction with group members are less able to alleviate the negative impact of work stress on the quality of life. The findings of this study highlight the special influence of the nature of police work on the quality of life, and further enhance the value and contribution of this study. In addition, this study also has the following theoretical and research implications, as well as practical implications.

Theoretical and Research Implications

First, by applying the multi-level theory, we found evidence to improve productivity and health indicators by buffering work stress.^{53,54} For instance, transformational leadership⁴⁶ and group member interactions⁴⁷ affect the level of work stress perceived by police officers. Secondly, using HLM, this study found the direct and indirect cross level effect of group-level transformational leadership and group member interactions on work stress perceived by the study participants through organizational environment and interpersonal relationships. This finding has revealed the original features of the organizational environment and interpersonal context of border police in Taiwan, pointing out that it is time to re-examine the cross-level effect of group factors on an individual's work stress, which is an important research implication as well as a major contribution of this study.¹⁶ Take the right measures, especially those related to human resource management, such as recruiting more stressful employees, choosing the right front-line managers, and giving them adequate training so that they can demonstrate appropriate leadership skills, enhance interaction among members, and facilitate communication and assistance among members. These are important to reduce the negative effect of work stress on employees. Furthermore, this study focused on the impact of work stress on police officers' work effectiveness and health indicators. This study takes into account the work factors of the Taiwan Border Police, statistically confirms the relevant research theories of the past, and clarifies the possible consequences of work stress on police officers. In other words, this study echoes theories and findings that work-related stress may play an important role in the development of police mental health problems, that shift-based police work can lead to chronic poor sleep quality and health problems, which in turn reduces quality of life and exacerbated job burnout.^{3,4,8,14} Lastly, this study examined the cross-level effect of group factors on personal factors. The job of border police in Taiwan is dangerous and full of temptation (ie, threats from illegal groups and money incentives). Moreover, border police in Taiwan need to cope with the 24-hour rotating shift, the dual role nature (ie, being a service provider as well as a law enforcer at the same time), and time pressure. Altogether, these form the objective and subjective context of the perception of work stress. This study found that the

police organization can reduce the impact of work stress on the level of job burnout and quality of life by developing managers' leadership style (ie, leaders who care and motivate) and creating an enabling environment promoting group member interactions (ie, communication and coordination).

Practical Implications

First, the study results here indicate that work stress increases employees' job burnout and decreases their quality of life. Kao,¹⁶ revealed that if an organization's management approach cannot timely reduce employees' stress, employee productivity and health indicators will suffer. For example, their job burnout will increase while their quality of life will decrease. For some organizations, it can be hard to eliminate negative factors of work stress immediately, but for border police, the organization could improve the situation by eliminating unnecessary on-call duties, adjusting the operation of duties, providing a better leave system, and changing some administrative practices. At the same time, the police organization can work to improve police officers' skills and expertise so that they can rapidly identify illegal activities of travelers. The organization should also shift police work more toward service provider side than law enforcement to boost police fulfillment and reduce job burnout. Secondly, leisure activities are important for reducing stress. As a result, organizations should encourage their employees to increase leisure activities to reduce work stress and the negative effects of work stress as well.⁸⁵ Therefore, Taiwan's border police organization should encourage its police officers to try various leisure activities to relax and cultivate hobbies because leisure activities can reduce work stress, help develop interpersonal relationships, boost spirits, enhance emotional control, and improve the quality of life.⁷² Another useful modification could be the introduction of job specialization, diversification and job rotation by Taiwan's border police organization to increase job diversity and broaden the skills of officials. These measures will reduce job burnout because police officers, who are encouraged and motivated by the organization and the managers, will need to acquire new skills to handle new tasks.¹⁶ Third, this study found that in transformational leadership style and group member interactions, these two group factors have a direct effect on police officers' perception of work stress. This finding suggests that when a police officer feels challenged at work, support, trust, and mutual dependency from his/her group members become important. In this case, if a leader show understanding and care, enlighten the employee, and concretely present the organizational vision, then the employee will perceive less work stress. In other words, the organization provides an instrumental support to employees,⁸⁶ allowing the employees, for example, to turn to someone for help when they feel challenged at work. An employee may also need help at work because he/she is going through some family or personal hard time.³ Lastly, this study discovered a unique phenomenon: while group factors displayed a cross-level moderating impact on the relation between police officers' work stress and job burnout, the quality of life of the police officer has not been affected. It is possible that the effects of group factors (ie, managers' leadership style and group member interactions) are more work-related. In comparison with job burnout, personal stress coping strategies, such as personal stress relief,⁸⁷ the amount of leisure activities or interactions with one's family,⁸⁸ should be taken into consideration when examining the impact of work stress on police officers' quality of life. The above may explain why the interaction between group factors and work stress minimizes job burnout but not quality of life. Based on the above, the police organization should hold many outdoor activities for police officers and invite their families to participate together to promote mutual understanding and interaction among supervisors, colleagues, and police family members to enhance interpersonal communication. In addition, in many ceremonial activities of the police, such as the acceptance of training results, or the award ceremony of meritorious police officers, the family of these trained or award-winning police officers are invited to observe the ceremony together. Besides making them feel honored, this can also let these police dependents understand the many aspects of the police's work and hard work, so as to promote the work-life balance of the police, and then allow the organization to retain excellent employees.⁸⁹

Conclusion

Conclusion

Overall, the findings of this study echo the views of the social environment model and interaction theory. That is, if an individual's response to the demands of the objective environment is not coordinated, it can affect his/her behavior and

health. Moreover, when the stress is high, if an individual's needs, capabilities or resources cannot be excluded or loaded, it will lead to an increase in employee's job burnout,⁹⁰ and a decrease in quality of life.⁹¹ Furthermore, these results showed that developing mutual trust and interdependence among group members through the leadership of manager (especially in case management support such as individualized care, encouragement, and inspiration) or promoting communication and coordination through group member interactions can reduce work stress of subordinates, which in turn will reduce the job burnout of police officers.

The findings of the study show that group factors can reduce employee's job stress and mitigate its negative effects, particularly in police organizations and perceptions of job burnout. In addition, although the supervisor's leadership style and the interactions among team members can reduce the employee burnout after stress, those group factors cannot improve their quality of life. This shows that organizations need to plan well for their lives and leisure to improve the quality of life of their employees. In conclusion, this study confirms the importance of group factors in the organization to reduce employee stress, and fills in the existing gap in the specific direction of how the organization should improve the employees' life quality, which is the greatest contribution of this study.

The Limitations of the Study and Suggestions for Future Researchers

Many valuable conclusions were obtained from this study. However, there are some limitations to this study. It is explained as follows, and offer some suggestions for future researchers. Firstly, this study is limited by many factors in terms of time, manpower and financial resources of the researchers, and it is impossible to conduct a comprehensive study on all the front-line police in Taiwan, so the empirical objects are limited to the front-line border police. Based on this, whether the results of this study can be extended to other similar agencies, such as other law enforcement officers who are also responsible for border security, depends on our further analysis and verification. Therefore, this study suggests that future researchers could expand the study to all border enforcement agents such as customs, police and coast guard, and even military personnel. In addition, this study is mainly based on quantitative questionnaire survey, and only one-time interviews are conducted, which is a cross-sectional study. Therefore, this study can only obtain the perceptive situation of the respondents at a certain point in time, and cannot understand the changes caused by the impact of group variables on employees' individual perceptions after a period of time. This is one of the limitations of this study. In this study, it is suggested that follow-up researchers can join focus interviews or in-depth interviews to conduct in-depth discussions on the research subjects. Furthermore, longer-term surveys or observational studies can be conducted to capture changes in the attitudes or behaviors of the research subjects. Finally, the shift system of the police and the work characteristics that focus on work efficiency and compliance rate make the workplace a high-pressure environment. Therefore, it is suggested that the future research directions can be directed towards exploring the factors that affect the management effectiveness of the front-line police-related workplaces, such as job design, interpersonal interaction, work-family conflict, etc.

Ethics Statement

The studies involving human participants were reviewed and the research protocol was established, according to the ethical guidelines of the Helsinki Declaration and was approved by the the National Cheng Kung University Human Research Ethics Committee, Taiwan (R.O.C). Written informed consent was obtained from individual or guardian participants.

Disclosure

The author reports no conflicts of interest in this work.

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