

Network of correlations between quality of life, resilience and effort-reward imbalance in military police officers

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Abstract *Objective: To analyze the network of correlations between the realms of the Effort-Reward Imbalance (ERI) model, resilience, and quality of life among military police officers. Method: This is a cross-sectional study conducted with 258 police officers from the Special Operations Battalion of the Military Police in a city in Rio Grande do Sul, Brazil. The scales of the ERI model, resilience, and World Health Quality of Life (WHOQOL-bref) assessed psychosocial stress, resilience, and quality of life. Descriptive and analytical statistics were performed employing the network analysis. Results: The realms of the ERI model and resilience correlated with all the WHOQOL's realms ($p < 0.001$). The network model showed a negative association between effort, overcommitment, and physical and environmental realms. The environmental realm was positively associated with reward, while resilience was positively associated with the general, physical, and psychological realms. Conclusion: We concluded that psychosocial stress interferes in the quality of life of military police officers, and resilience may work as a protective factor.*

Key words *Occupational health, Police, Resilience, Psychological, Stress, Psychological, Quality of life*

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Introduction

Police work worldwide is characterized by exposure to stress and risk of death¹⁻³, especially among military police officers. The level of stress is higher than in other professional categories, due to the characteristics of the activities performed, work overload, interpersonal relationships, low pay⁴, and poor working conditions⁵.

Conjoined with these conditions, urban violence is one of the significant social issues of poor and unequal countries⁶. Brazil harbors a strong relationship between geographic space and crime since a higher prevalence of violence⁷ is found in regions with a higher urbanization rate and demographic density. Moreover, poor working conditions and responsibility for public safety in the context of high crime levels in the country show strong commitment and low rewards, which can lead to psychosocial stress.

Psychosocial stress assessment can be performed using the Effort-Reward Imbalance (ERI) model, which is designed to identify adverse health effects in the face of occupational stressors and poor working conditions in developed and rapidly developing countries. It postulates that lack of reciprocity at work, characterized by “high cost/low gain”, i.e. the frustration of rewards after appropriate efforts, increases the risk of stress-related disorders⁸.

Psychosocial stress may be associated with organizational factors at work and individual and subjective aspects of professionals, especially resilience, characterized by creative and individual adaptation to the risks and adversities of daily work.⁹ Thus, resilience is essential to the mental health of workers and is a protective factor against work stress⁹, as well as a device to improve the quality of life.

The concept of quality of life is subjective, multidimensional, and includes positive and negative elements. It is characterized by an individual's perception of their position in life, in the context of culture, in their value systems, and regarding their goals, expectations, standards, and concerns.¹⁰ It is a broad and complex concept that traverses physical health, psychological state, level of independence, social relationships, personal beliefs, and relationship with environmental characteristics¹¹.

Over the past few years, few studies have been conducted in Brazil and around the world on police resilience¹², psychic changes, and their relationship with quality of life^{2,13}. Thus, the relationship between the realms of the ERI model,

resilience, and quality of life in military police is still a gap in the production of knowledge.

From this perspective, military police officers are a vulnerable group of workers who feel the adverse impact of activity¹ on health and quality of life. This effect is aggravated by the constantly increasing levels of the responsibility of ensuring the safety of the population, as opposed to higher crime rates and lower investments in public safety in recent years in Brazil. This discrepancy between the high demand of professionals, associated with low rewards, may be risk factors for the development of psychosocial stress and harm to the quality of life. Given the above, this study aims to analyze the network of correlations between the realms of the ERI model, resilience, and quality of life in the military police.

Methods

This is a cross-sectional study conducted at the Special Operations Battalion (BOE) of the Military Police of a large population city of the state of Rio Grande do Sul. The study population consisted of 416 police officers. The sample included active subjects, aged between 18 and 65 years, assigned to the BOE. The exclusion criteria for the sample were police officers who were absent from their duties or on leave for any reason during the data collection period, working less than one year in the corporation, and being female (because they represented less than 5% of the population). Based on these criteria, the eligible study population consisted of 263 military police officers. All eligible subjects were approached. Of these, 258 answered the data collection instrument.

Data were collected in 2013 at the headquarters of the BOE. Information regarding socio-occupational characteristics, psychosocial stress, and resilience was collected through self-reporting instruments. The choice of instruments was based on their psychometric properties of validity and reliability, suitable for use in the general population and the specific population of this study. They are widely used instruments for the evaluation of their constructs in national and international studies.

Socio-occupational data comprised age, marital status, post/graduation, length of service in the job, working elsewhere, overtime, work shift, tobacco use, sleeping hours, health problems, leisure, anthropometric and cardiovascular measures (blood pressure, weight, height, body mass index, waist circumference, hip circumference).

Psychosocial stress was measured using the ERI model – short version¹⁴. The short version validated in Brazil¹⁵ was considered reliable ($\alpha=0,703$). In this study, a factor analysis of the scale was performed, in which the questions were grouped into three factors: reward, effort, and overcommitment. Data from the three realms were analyzed as continuous data.

The instrument developed by Wagnild and Young¹⁶ and validated in Brazil¹⁷ was used to assess resilience. The World Health Quality of Life (WHOQOL-bref) instrument was used to assess the quality of life, which was developed by the World Organization. The WHOQOL-bref contains 26 questions grouped into five realms, namely, Physical (PR), Psychological (PsyR), Social Relationships (SRR), Environmental (ER) and General (GR).

The collected data were organized in spreadsheets using Excel®. They were then transposed into the SPSS® (Statistical Package for Social Sciences, SPSS Inc., Chicago) version 18.0 for Windows. Data were analyzed through descriptive and inferential statistics techniques. Categorical variables were shown with absolute and relative frequencies. Continuous variables were shown as measures of central tendency (mean and median) and dispersion (standard deviation and interquartile range). The Shapiro-Wilk normality test was performed to verify the distribution of variables, asymmetry, and kurtosis values. Student's t-test was used to associate variables with symmetrical distribution, and Mann-Whitney was used for asymmetric distribution. Pearson (for symmetric variables) and Spearman (for asymmetric variables) bivariate correlations were performed to assess the relationship between continuous variables and the quality of life outcome.

A network analysis was conducted to investigate the relationships between the realms of quality of life, resilience and the dimensions of the ERI model, which comprises two steps: the first one is to estimate the matrix of regularized partial correlations; in the second step, the matrix of partial correlations is represented in a two-dimensional plane on a graphical object. Vertices represent the investigated variables, and edges the partial relationship between them, which may vary in thickness (magnitude) and pattern (positive or negative). A positioning algorithm is used, in which the variables are approximated/removed as per their association¹⁹. Descriptive measures of the network were also reported, showing the level of association and the expected influence of each variable.

Finally, community analyses were conducted to identify subgroups present within the system. The algorithm used was a hierarchical method²⁰, which is based on the streamlining of the modularity measure (intra-vertex association), starting from the simplest model of a cluster, and then dividing the graph into “n” subgroups. The number of clusters is defined by the smallest value of modularity. This analysis aimed to identify predictor clusters in the investigated system.

The Research Ethics Committee of the Federal University of Rio Grande do Sul approved the research under opinion nº 17985. The ethical principles were respected, and all subjects who participated in the research signed the Informed Consent Form.

Results

Military police officers had medians of 36 years of age (31-45), 11 years of schooling (11-13), and 1 child (0-2). The highest percentage had a partner (69,0%), was a serviceman (75,1%), had another job (61,6%) and worked overtime (67,4%). When the lifestyle was evaluated, the officers had a median of 6 (6-7) daily hours of sleep, 89,5% were non-smokers, 64% had little leisure time, 23,8% had health problems, and 15,5% were on medication.

Regarding the anthropometric and cardiovascular characteristics of police officers, the median of systolic and diastolic pressure was 134 mmHg (125; 45) and 86 mmHg (77,75; 94.0), respectively; waist and hip circumference was 91,5 cm (85,75;97) and 103 cm (99; 108), respectively. Weight and height averaged 84,6±10,6 kg and 176,6±6,2,4 cm, respectively.

Police officers with no health problems, who did not use medications and who did not work in another job had higher means in the WHOQOL-bref Physical Realm (PR) ($p<0,05$). There was a correlation between variables weight ($r=-0,148$; $p=0,020$), waist circumference ($r=-0,193$; $p=0,002$), variable sleeping hours ($r=0,180$; $p=0,005$) and the PR. The Psychological Realm (PsyR) had higher means for non-smoking police officers without a partner, who had no health problems and had no other job ($p<0,05$).

Police officers with health problems and another job had lower means in the Social Relationships Realm (SRR) ($p<0,05$). The same realm correlated inversely with waist circumference ($r=-0,150$; $p=0,018$). The Environmental Realm (ER) had higher means for the daytime work cat-

egory ($p=0,037$) and correlated with satisfaction with remuneration ($r=0,325$; $p<0,001$).

The WHOQOL General Realm (GR) had higher means for non-smoking police officers with no health problems, who did not use medications, worked during the day shift. Additionally, it was correlated with waist circumference ($r=-0,143$; $0,021$), systolic blood pressure ($r=0,136$; $p=0,039$) and sleeping hours ($r=0,203$; $p=0,001$).

The realms of the ERI model – Reward (R), Effort (E) and Overcommitment (O) - and Resilience (Res) correlated with all WHOQOL realms ($p<0,001$), as shown in Table 1:

The network of regularized partial correlations between the realms of quality of life, resilience, and the realms of the ERI model is shown in Figure 1.

The edges show positive associations between the ERI model realms quality of life, resilience,

and reward (solid lines), and negative associations between the physical and environmental realms and ERI model's "overcommitment" and "effort" realms. In this figure, we can observe the sub-clusters identified by the Louvain algorithm. This result shows that, unlike quality of life realms, the "environmental" realm associated with the "reward" realm of the ERI model. The other variables had more significant associations with their clusters.

By analyzing the centrality measures of the regularized partial correlation network, one can identify the most relevant variables in this system, possible candidates for intervention, in order to produce changes in the other variables. The proximity measure shows that the physical realm of quality of life is the variable most associated with the other variables in the system. This means that it can be an essential variable for

Table 1. Distribution of quality of life realms (WHOQOL-bref), by work and lifestyle variables. Porto Alegre, Rio Grande do Sul, Brazil, 2013. (n=258)

Variables	PR	PsyR	SRR	ER	GR
Marital status					
With partner	15,11±2,21	15,42±2,12	15,92±2,45	13,20±2,47	15,42±2,13
Without partner	15,62±2,14	16,06±1,97	16,25±2,54	13,58±2,26	16,06±2,60
	$p=0,094$	$p=0,028$	$p=0,345$	$p=0,240$	$p=0,163$
Smoker					
No	15,53±2,17	15,98±1,98	16,25±2,48	13,53±2,28	15,60±2,40
Yes	14,92±2,02	14,74±2,11	15,46±2,66	12,86±2,64	14,44±2,85
	$p=0,183$	$p=0,004$	$p=0,136$	$p=0,170$	$p=0,021$
Health problems					
No	15,75±2,09	16,06±2,10	16,38±2,42	13,64±2,25	15,64±2,48
Yes	14,54±2,17	15,21±2,0	15,48±2,62	13,25±2,53	14,91±2,35
	$p<0,001$	$p=0,006$	$p=0,016$	$p=0,436$	$p=0,046$
Medications					
No	15,64±2,09	15,95±2,02	16,29±2,41	13,54±2,28	15,95±2,02
Yes	14,51±2,31	15,33±2,04	15,49±2,97	12,98±2,53	15,33±2,04
	$p=0,003$	$p=0,085$	$p=0,073$	$p=0,171$	$p=0,021$
Working elsewhere					
No	15,71±2,15	16,10±1,97	16,45±2,41	13,56±2,26	15,58±2,38
Yes	15,07±2,15	15,46±2,07	15,68±2,64	13,26±2,43	15,30±2,64
	$p=0,027$	$p=0,018$	$p=0,022$	$p=0,340$	$p=0,373$
Work shift					
Daytime	15,51±2,27	16,13±2,04	16,56±2,35	14,01±2,10	15,94±2,33
Daytime and Nighttime	15,47±2,06	15,65±2,06	15,88±2,73	13,16±2,43	15,27±2,42
	$p=0,892$	$p=0,088$	$p=0,052$	$p=0,007$	$p=0,037$
Age	-0,072	0,030	-0,096	0,070	0,014
	$p=0,260$	$p=0,643$	$p=0,137$	$p=0,276$	$p=0,828$

it continues

Table 1. Distribution of quality of life realms (WHOQOL-bref), by work and lifestyle variables. Porto Alegre, RS, Brazil, 2013. (n=258).

Variables	PR	PsyR	SRR	ER	GR
Nº of children	-0,056 p=0,388	-0,042 0,511	-0,092 p=0,153	-0,028 p=0,666	-0,077 p=0,221
Schooling	0,022 p=0,734	-0,042 p=0,523	-0,016 p=0,803	-0,042 p=0,523	-0,036 p=0,576
Weight	-0,148 p=0,020	0,004 p=0,946	-0,029 p=0,648	0,004 p=0,946	-0,073 p=0,245
Height	-0,068 p=0,284	-0,068 p=0,288	-0,068 p=0,165	-0,068 p=0,288	-0,055 0,382
Waist circumference	-0,193 p=0,002	0,014 p=0,830	-0,150 p=0,018	0,014 p=0,830	-0,143 0,021
Hip circumference	-0,116 p=0,069	0,072 p=0,259	-0,049 p=0,446	0,072 p=0,259	-0,096 p=0,125
Systolic Blood Pressure	0,030 p=0,653	0,118 p=0,082	0,010 p=0,881	0,118 p=0,082	0,136 p=0,039
Diastolic Blood Pressure	-0,035 p=0,606	0,102 p=0,132	-0,013 p=0,845	0,102 p=0,132	-0,009 p=0,893
Salary satisfaction	0,118 p=0,065	0,109 p=0,089	0,075 p=0,241	0,325 p<0,001	0,102 p=0,104
Length of service	-0,060 p=0,347	0,022 p=0,734	-0,068 p=0,283	0,092 p=0,150	0,036 p=0,570
Length of service in the job	-0,117 p=0,067	0,019 p=0,766	-0,042 p=0,509	0,022 0,729	-0,009 0,881
Sleeping hours	0,180 p=0,005	0,119 p=0,064	0,078 p=0,226	0,074 p=0,247	0,203 p=0,001
Resilience (RES)	0,437 p<0,001	0,501 p<0,001	0,366 p<0,001	0,354 p<0,001	0,420 p<0,001
Effort (E)	-0,412 p<0,001	-0,352 p<0,001	-0,257 p<0,001	-0,324 p<0,001	-0,266 p<0,001
Reward (R)	0,208 p=0,001	0,252 p<0,001	0,197 p=0,02	0,350 p<0,001	0,169 p=0,007
Overcommitment (O)	-0,486 p<0,001	-0,430 p<0,001	-0,306 p<0,001	-0,354 p<0,001	-0,292 p<0,001

Source: Search data, 2013.

transmitting effects of stress on other realms of quality of life. Thus, it is the variable that most relates to risk factors, and therefore, adversely influences the perception of the quality of life in other realms. The expected influence measure, on the other hand, indicates the variables that, once activated, have a higher probability of generating (positive or negative) variations in the nearby variables. Once modified, the general and psychological realms of quality of life tend to produce positive variations in the proximal variables; in this case, the other realms of quality of life. Once activated, the overcommitment vari-

able tends to produce negative variations in the proximal variables; in this case, the realms quality of life, primarily physical and environmental.

Discussion

The results presented in this paper arouse reflections on the factors that may interfere with the quality of life of military police, including personal, work characteristics, psychosocial stress, and resilience. Some individual characteristics, such as health problems, medication use, sleep-

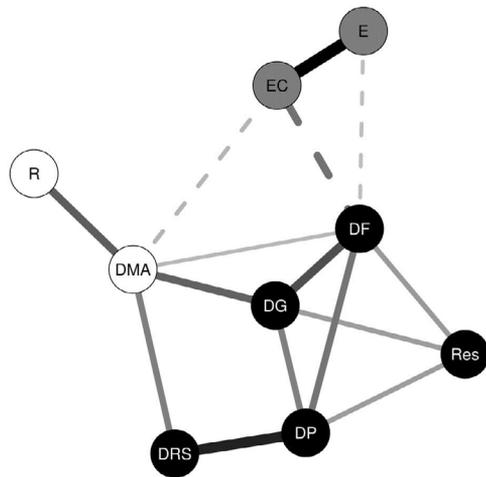


Figure 1. Network of regularized partial correlations between the realms of quality of life (PR, PsyR, ER, SRR, and GR), resilience (R), and ERI Model realms (E, Res, and EC). Vertices represent variables and edges represent positive (solid line) and negative (dotted line) associations. The color of the vertices represents communities (subgroups) identified in the community analysis.

ing hours, tobacco use, waist circumference, as well as work variables (having another job, satisfaction with pay and work shift) had an impact on the quality of life of military police officers of this study.

The highest means of the physical realm were related to the absence of a second job and inversely to weight, waist circumference, and sleep, suggesting that a higher workload interferes with the police officers' quality of life and, consequently, shorter rest time, and lower levels of physical activity and health care. A study conducted in the state of Minas Gerais identified that the lower perception of police officers about the physical realm is associated with characteristics of their work activity as military men, changes in work shifts, the type of activity to which the military is subjected and the relationship of work and rest hours drastically affect quality-of-life parameters such as sleep and engaging in regular physical activity²¹.

The findings showed that, besides interfering in the physical realm, having another job affects

the realm of social relationships and the psychological realm of quality of life. Accordingly, research indicates that family life and friends' social support are necessary parameters for the quality of life of military police officers²¹, and may be harmed due to overwork and accumulated duties of police officers when performing more than one activity.

Tobacco use, coupled with a lack of healthy lifestyle, affects health. A study conducted in Ethiopia showed that 88,2% of police officers did not have healthy food, 70% consumed alcohol, and 36,1% were sedentary. Also, 6,7% were smokers, 83% of whom were daily smokers, indicating harm to the quality of life²². The psychological realm showed lower means for smoking police officers and could be related to both the consequences and factors leading to tobacco use. Besides, police with health problems had lower means in the social relationship realm.

Since the work of the military police officer requires intense and frequent use of physical force, the anthropometric variables showed borderline reference values, pointing to the need for attention to the health of police officers, as well as a relationship with a lower quality of life, with the psychological, physical and social relationships realms. Another Brazilian study aimed at identifying the level of physical activity of military police officers showed that they were out of population normality regarding fat percentage, waist-hip circumference ratio, body mass index and sedentary as per the International Physical Activity Questionnaire, showing high or moderate risk to health²³. In this study, the general realm evidenced higher means for non-smoking police officers, without health problems and use of medications, showing a relationship with waist circumference and systolic blood pressure.

The environmental realm was higher for daytime police officers who were more satisfied with their monthly income. Concerning the environmental realm, the study²¹ evidenced that the low perception of the military is associated with the fact that all individuals evaluated are housed in municipal police departments. Stressing factors present in large metropolises such as the time spent in transportation, the lack of physical safety and protection for the military and their families, as well as the cost of living lowers the level of perceived quality of life. Another study pointed to compromised quality of life of the military police officers of inland State of São Paulo in the factors related to the environmental realm, suggesting the need for improvements for issues related to

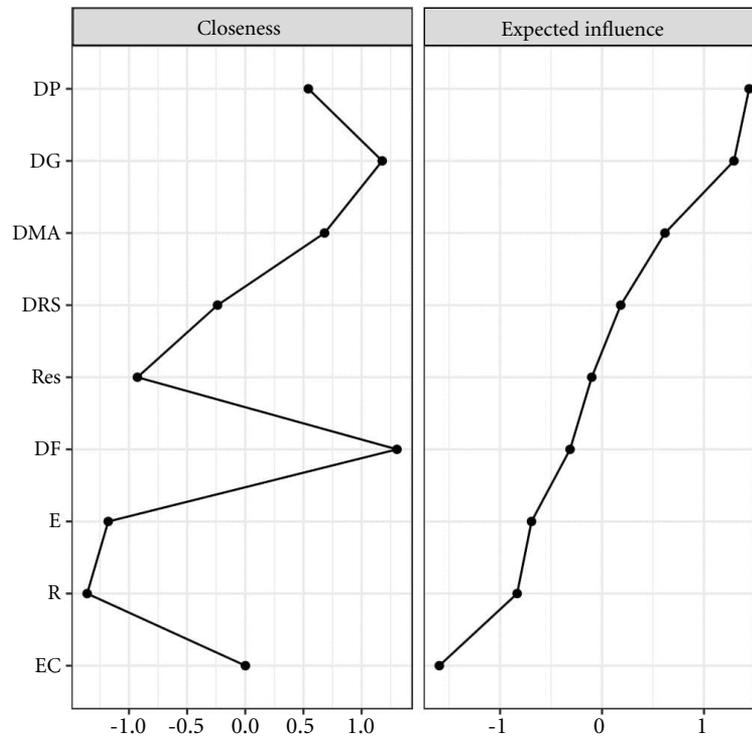


Figure 2. Standardized closeness and expected influence measures for the network of regularized partial correlations. The closeness measure indicates the variables most associated with other variables in the system (high positive values). The expected influence measure indicates the variables that deactivate (high negative values) and activate (high positive values) other variables in the system.

the physical safety and protection of these professionals, environmental conditions of their working area, financial resources and transportation, as well as the home environment²⁴.

Besides the risk factors inherent in the military police profession, Brazil also lacks structure for the development of work, including the need for psychological support to workers. A study conducted in Rio Grande do Sul (Brazil) found dissatisfaction among police officers regarding work and the realms that underpin this theoretical model, which recorded dissatisfaction with salary and career advancement²⁵.

Civilian and military police officers working in Special Operations Units in the state of Santa Catarina (Brazil) had a fair perception of their working conditions. The remuneration and benefits and physical environment components were perceived more negatively. Concerning occupa-

tional stress, most police officers considered their work as low demand, control, and social support. Also, there was a direct inverse relationship between working conditions and occupational stress⁵.

A study conducted in Greece to examine perceived stress, job satisfaction, quality of life, and their relationships showed that perceived stress levels have a substantial adverse effect on job satisfaction and quality of life. Senior officers had a higher level of dissatisfaction with their work².

This study evidenced that the general realm, psychological realm, and resilience work are protective factors for stress and negative perception of other quality of life realms. Psychological resilience can protect mental health disorders over an average period, especially when mental health disorders show their first signs¹². A study points out that while developed-country govern-

ments in Europe, Canada, and the United States have invested in tactical training and technology equipment, resilience has not been a component of police training²⁶. It also adds that it is fundamental to strengthen tools to promote resilience and keep personal well-being since police officers are routinely charged with facing a life-threatening routine²⁶.

Resilience, as a protective factor, may eventually help identify individuals who are at high risk of developing trauma-related illnesses, such as police officers, firefighters, and military police officers²⁷. This high exposure to inherent professional risk factors reflects in lower quality of life with the presence of depression, physical illness, and high stress levels²⁸.

A study in India pointed out that most perceived sources of occupational stress are related to workplace issues, and changes can be implemented within the police department to prevent stress and its effects. Measures include adequate training to relieve stress and increase self-efficacy and coping skills, and departmental mental health programs to address stress-related problems as they occur. The police institution can also introduce steps to improve the public image of the police²⁹.

Prevention programs should be provided to police officers, with proactive worker activities related to the critical analysis of stress, investing in empirically tested and evidence-based mental preparations²⁶. Also, the reward plays a fundamental role in the police officer's quality of life and is the result of valuation and adequate working conditions.

The limitations of the study refer to the lack of paper on resilience, stress, and quality of life of police officers, which would allow us to advance the discussion about associated factors and predictors of quality of life in this corporation.

Self-report instruments have some limitations, such as biases and response styles; however, behavioral estimates have a good level of reliability when compared to other techniques. Also, the cross-sectional design does not allow cause-effect inferences.

Conclusion

The network of correlations between the realms of the Effort-Reward Imbalance model, resilience and quality of life in military police officers showed a negative association between effort and overcommitment with the physical and environmental realms. The environmental realm was positively associated with reward, and resilience was positively associated with the general, physical, and psychological realms, and is a protective factor for the quality of life in this population. We found that psychosocial stress and resilience interfere with the quality of life of military police officers since the realms of effort, reward, and overcommitment of the ERI model and resilience correlated with all WHOQOL realms.

Workers such as military police officers deserve more attention since their performance in public security predisposes high cost and low gain, which reflects in the productive capacity of the professional and the service provided by them. Health professionals can provide actions towards the quality of life and work performance of these professionals. However, investments in infrastructure and a category valuation policy are crucial to the health and safety of the studied group. Given the complexity of the subject, it is necessary to conduct studies with a qualitative approach to understand the reasons that interfere with lower quality of life of military police officers.

Collaborations

JP Tavares contributed to the design of the project, data collection, data analysis, article writing, approval of the published version. LS Vieira, RF Cecon and WL Machado contributed to the analysis data, article writing and version approval published. D Dal Pai and SBC Souza cooperated in project design, article writing and approval of the published version.

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