



## RESILIENCE IN THE PROCESS OF COPING WITH TRAUMATIC SITUATIONS AMONG PILOTS IN THE MISSIONS OVERSEAS

Małgorzata KOWALCZYK<sup>1</sup>, Agata ORZECZOWSKA<sup>1</sup>, Monika TALAROWSKA<sup>1</sup>, Krzysztof ZBORALSKI<sup>1</sup>, Marian MACANDER<sup>2</sup>, Olaf TRUSZCZYŃSKI<sup>2</sup>, Piotr GAŁECKI<sup>1</sup>

<sup>1</sup> Medical University of Lodz, Department of Adult Psychiatry, Lodz, Poland

<sup>2</sup> Military Institute of Aviation Medicine, Flight Safety Division, Warsaw, Poland

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**Author's address:** M. Kowalczyk, Medical University of Lodz, Department of Adult Psychiatry, ul. Aleksandrowska 159, 91-229 Lodz, Poland, e-mail: malgorzata.kowalczyk@umed.lodz.pl

**Introduction:** Resilience is a set of personality traits and abilities that enable coping with difficult situations as well as with the stress associated with them. The aim of this study was to characterize the resilience personality traits and their relationship to stress and coping strategies in pilots taking part in overseas missions.

**Methods:** The study was conducted in 123 pilots and 113 anti-terrorists who had previously taken part in overseas missions. Participants were assessed psychologically with the use of three questionnaires measuring perceived stress, strategies of coping with stress and resilience personality traits. The assessment was performed before as well as during missions.

**Results:** Soldiers who are characterized by the resilience personality traits tend to use rational strategies of solving difficult and stressful situations rather than strategies of avoidance or those oriented on emotions. Moreover, the same soldiers tend to experience significantly less stress.

**Discussion:** The results can have a significant influence on the process of pre-selection of pilots for overseas missions as well as on the methods of stress monitoring during performance of such missions.

**Conclusions:** Our research can help elucidate mechanisms underlying the phenomenon of stress as well as psychological components of successful coping in stressful situations.

**Keywords:** resilience personality, stress, styles of coping with stress

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## INTRODUCTION

Resilience is a notion that causes a lot of concern in the scientific literature, partly because of its vague nature as well as the difficulties associated with conceptualization and subsequent use of this notion in empirical studies. In the literature on the subject, resilience is described, as sturdiness, springiness, elasticity, psychological strength or adaptability [10,20]. There are difficulties in translating the notion of resilience into the Polish language. Because the notion of resilience enables a simultaneous description of both the properties of the individual and the process, it is increasingly used in the research area of coping with stress and difficult life situations [10].

Resilience is a multidimensional notion that encompasses biological factors (genetic, biochemical and physiological factors), cognitive factors, emotional factors as well as behavioral factors. The notion of resilience can be used with respect to a single situation and to life experience of the individual in general [8]. It comprises a set of personality traits and abilities that enable coping with difficult situations associated with severe stress [3,20].

The term "resilience" was first used by Jack Block in the middle of the 20th century. Then, it was associated with the theory of psychological resilience (resiliency) viewed as self-control (the control of ego), which helps with an adequate understanding and dealing with a given situation emotionally and volitionally [14].

Zenon Uchnast was the first to use resilience in the Polish literature. He described resilience as the "springiness of ego" as reflected by effective and adequate coping in everyday life as well as in traumatic situations. Uchnast supplemented the notion coined by Block with Maslow's developmental dilemma of "safety – person – growth". According to Uchnast [26,27], resilience develops on the foundation of a sense of closeness and trust towards oneself. Moreover, a resilient person tends to adapt one's own effectiveness to external factors rather than regulate internal emotional states.

The notion of resilience tries to explain the process by which a person copes with life difficulties effectively throughout the life-span. This process is described as a dynamic phenomenon that reflects a good adaptation despite experiencing threatening or traumatizing events [4]. Researchers in the field of positive psychology see resilience as an ability to regulate emotions, especially positive emotions, that helps achieve adaptation to difficult and stressful conditions [25].

In the literature on the subject matter, resilience is also viewed as a property of both an individual and a process whereby the individual acquires traits and abilities necessary for successful and flexible coping in difficult situations by having different experiences throughout the life-span. In this regard, the notion of resilience is similar to Antonovsky's theory of salutogenesis whereby a stressful situation is perceived as an opportunity to acquire new abilities that can be transferred into psychological resources [1]. In such a situation, the fact of solving a problem results in an accumulation of psychological resources that can be associated with the development of the resilience personality traits.

Psychological stress is caused by an interaction between the external environment and an individual. The perception of stress is caused by a situation that is construed by an individual as overly demanding or requiring psychological resources that are not available to the individual [11]. Among key psychological features that influence the choice of a coping strategy there is emotional stability, coherence, self-efficacy, and optimism [11]. Therefore, it can be suspected that resilience, viewed as a psychological trait, plays an important role in the process of coping with stressful situations. Currently, this issue is gaining interest in terms of developing the traits of the resilience personality, especially in professions whose work is associated with significant exposure to stress. However, there have been few empirical studies dealing with this subject.

## AIM OF THE STUDY

The aim of the study was to determine psychological traits that predispose to a successful adaptation to stress. Moreover, in pilots taking part in peace missions overseas, we tried to better understand the relationship between the resilience personality traits and successful coping in difficult situations. Anti-terrorists were included for comparison.

## MATERIALS AND METHODS

Over a period of three years (2010-2013), we studied 236 respondents (soldiers taking parts in overseas missions) including 123 pilots (52.12%) and 133 anti-terrorists (47.88%). All participants were included after a thorough check-up carried out in the Military Institute of Aviation Medicine (MIAM) in Warsaw. Before enrollment in the study,

participants signed an informed consent. Psychological predispositions were assessed in soldiers before recruitment for specific duties. During overseas missions, participants were exposed to stress of a similar intensity. Stress associated with life endangerment was severe enough as to enable an assessment of moderate and severe stress. Because of routine check-ups for chronic conditions and psychological and laboratory assessments, the physical condition of participants was considered good.

The mean age of participants was (N=236) 32.43 years (SD=6.82, range 22-67 years). The study was designed in two stages:

- a) Stage I (before missions): assessment of psychological features of the stress reaction (with the use of psychological tools described below). All participants were enrolled at this stage.
- b) Stage II (during missions): the level of perceived stress was assessed during routine check-ups (Perceived Stress Scale, S. Cohen). At this stage, 189 participants were enrolled owing to the long duration of the study.

Psychological assessment of pilots was carried out with the use of the following questionnaires:

1. Resiliency Scale (ER 89) by J. Block and A. Kremen in the Polish adaptation by Ł. Kaczmarek - measurement of traits of the resilience personality (Stage I of the study).
2. COPE questionnaire by J. Carver - measurement of strategies of coping with stress. This questionnaire consists of 60 items on 15 dimensions (strategies of coping with stress) with 4 items per each scale (dimension). The arithmetic mean of scores indicates which strategy is preferred (Stage I of the study).
3. Perceived Stress Scale (PSS) by S. Cohen (as adapted by Z. Juczynski) - measurement of perceived stress during the period of one month before completion. The total score is in the range of 0-40 points where higher scores correspond to higher levels of perceived stress (Stage I and Stage II of the study).

All questionnaires were published by the Psychological Test Laboratory of the Polish Psychological Association. They were all standardized and normalized psychometric tools. The study was performed in accordance with appropriate legal regulations concerning personal data protection and was approved by the Bioethics Committee of the Medical University of Lodz (No. RNN/882/11/KB, 13th December, 2011). Participants signed an informed consent on entering the study.

## RESULTS

For statistical analysis, we used selected descriptive statistics and subsequently applied statistical inference. We used two-tailed tests of statistical significance.

For numeric variables, arithmetic mean was used (M). Range (minimal – maximal value) and standard deviation (SD) were used as measures of dispersion.

We used the Shapiro-Wilk test to find the normality of distribution of the studied variables. For variables with a non-normal distribution, non-parametric significance tests were used – Pearson's  $\chi^2$ , Man-Whitney U-test for two independent samples and Wilcoxon's test for dependent samples. The Spearman's correlation coefficient was used to estimate correlations between variables. Statistical significance was considered at  $p < 0.05$ .

For statistical analysis, we used the STATISTICA PL software (version 10).

For the entire study population, the mean value of perceived stress on the PSS scale was slightly higher before missions in comparison to the value obtained during missions (Tab. 1.). This difference was statistically significant (Wilcoxon's test = 5.198;  $p < 0.001$ ).

Tab. 1. Descriptive statistic for the Perceived Stress Scale (PSS) by S. Cohen.

| Scale name   | N   | M     | SD   | Minimum | Maximum |
|--------------|-----|-------|------|---------|---------|
| PSS-stage I  | 236 | 10.33 | 5.00 | 0       | 24      |
| PSS-stage II | 189 | 8.87  | 5.00 | 0       | 33      |

M-mean; SD-standard deviation, N- number of participants

Tab. 2. presents basic scores obtained in the COPE questionnaire designed by J. Carver for the measurement of strategies of coping with stressful situations. Based on the mean scores, it seems that the studied soldiers tend to use rational coping strategies – Planning, Positive Reinterpretation and Growth, and Active Coping.

We compared pilots and anti-terrorists with the use of the Mann-Whitney U-test to test for differences in the analyzed variables (Tab. 3.). The group with a higher value was marked with PL (pilots) or AT (Anti-terrorists) next to the U-test value.

Based on the tests of statistical significance used, pilots and anti-terrorists differed significantly with respect to several variables. It is worth noting that, during stage I, anti-terrorists had a higher mean score on the PSS, whereas in stage II of the study, a higher mean score was found in pilots. As regards the ER-89 scale, pilots had significantly higher scores than anti-terrorists. This means that pilots have a higher level of resiliency.

Based on the COPE scores, it can be said that rational coping strategies were favored by the studied participants in general, although pilots had higher scores in rational styles of coping than anti-terrorists. Moreover, anti-terrorists had higher mean scores than pilots in avoidance-oriented and emotion-oriented styles of coping.

Tab. 2. Descriptive statistics for the COPE questionnaire by J. Carver (N = 236).

| Scale name                           | N   | M     | SD   | Min. | Max. |
|--------------------------------------|-----|-------|------|------|------|
| Active coping                        | 236 | 11.21 | 2.32 | 4    | 16   |
| Planning                             |     | 12.08 | 2.93 | 4    | 28   |
| Use of instrumental social support   |     | 10.51 | 2.45 | 4    | 16   |
| Use of emotional social support      |     | 8.83  | 2.63 | 4    | 16   |
| Suppression of competing activities  |     | 10.49 | 2.33 | 4    | 16   |
| Religious coping                     |     | 7.25  | 2.89 | 0    | 16   |
| Positive reinterpretation and growth |     | 11.22 | 2.34 | 5    | 16   |
| Behavioral disengagement             |     | 10.20 | 2.11 | 4    | 16   |
| Acceptance                           |     | 9.95  | 2.68 | 4    | 16   |
| Focus on and venting of emotions     |     | 7.81  | 1.81 | 4    | 14   |
| Denial                               |     | 6.09  | 1.98 | 3    | 13   |
| Mental disengagement                 |     | 7.27  | 1.94 | 2    | 13   |
| Restraint                            |     | 6.27  | 1.96 | 4    | 11   |
| Substance use                        |     | 5.13  | 2.06 | 1    | 13   |
| Humor                                |     | 7.03  | 2.52 | 3    | 16   |

M-mean; SD-standard deviation, N- number of participants

Tab. 3. Mann-Whitney U-test values for differences between pilots and anti-terrorists on the studied scales.

| Scale name                           | Test value U | P     |
|--------------------------------------|--------------|-------|
| PSS – stage I                        | 2.664 AT     | 0.008 |
| PSS – stage II                       | 3.812 PL     | 0.001 |
| Active coping                        | 2.583 PL     | 0.010 |
| Planning                             | 3.884 PL     | 0.000 |
| Use of instrumental social support   | 1.611 PL     | 0.107 |
| Use of emotional social support      | 0.270 PL     | 0.787 |
| Suppression of competing activities  | 2.326 PL     | 0.020 |
| Religious coping                     | 4.063 AT     | 0.000 |
| Positive reinterpretation and growth | 3.164 PL     | 0.002 |
| Behavioral disengagement             | 1.353 PL     | 0.176 |
| Acceptance                           | 0.421 PL     | 0.673 |
| Focus on and venting of emotions     | 1.953 AT     | 0.051 |
| Denial                               | 4.054 AT     | 0.000 |
| Mental disengagement                 | 3.869 AT     | 0.000 |
| Restraint                            | 3.060 AT     | 0.002 |
| Substance use                        | 4.228 AT     | 0.000 |
| Humor                                | 4.441 AT     | 0.000 |
| ER-89                                | 3.306 PL     | 0.001 |

PL – pilots, AT – anti-terrorists; p – statistical significance

We used the Spearman’s R coefficient to analyze the relationships between the studied variables. This method determines if an increase in one variable is accompanied by an increase or a decrease in another. The relationship between the scores on the Perceived Stress Scales recorded during both stages of the study was statistically significant ( $R=0.67, p<0.001$ ). This shows that there was an association between stress levels before and during missions.

The correlations between the above-mentioned scales and scales measuring the traits of the resilience personality were as follows: PSS\_I (stage I) –  $R=-0.26, p<0.001$ , PSS\_II (stage II) –  $R=-0.42, p<0.001$ . This shows that this relationship is statistically significantly and inversely proportional as higher values of stress are associated with lower values on the ER-89 scale. Moreover, this relationship is stronger for stage II of the study, which is in line with the assumptions and interpretation of the resilience personality.

Tab. 4. presents Spearman’s rank coefficients between the studied variables for the entire study population.

As can be seen in Tab. 4., the resilience personality traits and perceived stress correlated significantly with the majority of the coping scales used.

The scores in the resilience personality scale (ER-89) were significantly and positively correlated with the following COPE scales – Active coping, Planning, Positive reinterpretation and growth, and Restraint. Therefore, it can be postulated that

Tab. 4. Spearman’s rank coefficients between the studied variables for the entire study population. (N = 238).

| Scale name                           | ER-89    | PSS_I    | PSS_II   |
|--------------------------------------|----------|----------|----------|
| Active coping                        | 0.22***  | -0.28*** | -0.19**  |
| Planning                             | 0.26***  | -0.32*** | -0.24*** |
| Use of instrumental social support   | 0.11     | -0.17**  | -0.08    |
| Use of emotional social support      | 0.10     | 0.03     | -0.04    |
| Suppression of competing activities  | 0.12     | -0.21**  | -0.12    |
| Religious coping                     | -0.13*   | 0.22***  | 0.20**   |
| Positive reinterpretation and growth | 0.31***  | -0.35*** | -0.35*** |
| Behavioral disengagement             | 0.20**   | -0.21*** | -0.24*** |
| Acceptance                           | 0.08     | -0.15*   | -0.14    |
| Focus on and venting of emotions     | -0.12    | 0.31***  | 0.19**   |
| Denial                               | -0.17*   | 0.35***  | 0.23**   |
| Mental disengagement                 | -0.09    | 0.27***  | 0.20**   |
| Restraint                            | -0.23*** | 0.35***  | 0.29***  |
| Substance use                        | -0.24*** | 0.31***  | 0.20**   |
| Humor                                | -0.08    | 0.25***  | 0.15*    |

\*  $p<0.05$  \*\*  $p<0.01$  \*\*\*  $p<0.001$

the higher the scores on the resilience personality scales in soldiers, the more likely is the use of rational coping strategies. This is also supported by the fact that avoidance and emotion-oriented coping styles were negatively correlated with resilience personality traits. A similar situation is seen in the case of perceived stress at both stages of the study as substantiated by negative values of Spearman's coefficients between rational COPE scales and stress as well as by negative values of Spearman's coefficients between irrational COPE styles and stress.

## DISCUSSION

The concept of resilience creates an opportunity to try to develop efficient coping strategies for difficult life situations as well as for prophylaxis of various mental disorders (disease, disease of a loved one, job lose, changes in life situation) [29]. The advantage of the concept of resilience is that it is not concentrated on deficits and weaknesses but focuses on psychological resources of an individual throughout life-span [10].

Based on our research, soldiers who are characterized by the resilience personality tend to use rational strategies of coping with difficult and stressful situations instead of strategies oriented on emotions or avoidance. Moreover, they also seem to experience less stress.

The theory of positive psychology focuses on mental elasticity that enables efficacious regulation of emotions [25]. In this process, disengagement from negative emotions (bounce back) and an induction of positive emotions play an important role [10,20]. Owing to such a mechanism, it is possible to better cope with stress by employing strategies such as task-orientation or positive reinterpretation. It is possible, though that an individual with a mental elasticity looks away from a given problem instead of solving it. Alternatively, an emotional cost of solving a problem can be seen later on. It has been pointed out that unfavorable coping strategies (coping ugly) are used to ease psychological tension associated with a difficult or traumatic situation and are not aimed at solving problems [3]. Holchhalter et al. [12] underline that resilience can work in two ways. There can be a situation in which an individual uses constrictive coping strategies for a long period following a traumatic event. On the other hand, an individual who initially copes well with a given situation develops unfavorable coping strategies with time.

Our research shows differences in coping styles between different military personnel. When analyzing a given coping strategy in the studied participants, one has to take into account the role of personality and factors that influence it, i.e. genetic and environmental factors.

There is ongoing research on factors that determine the development of the resilience personality and efficacious coping in different professions.

The most widely studied group is healthcare staff and especially nurses. In a large study, it has been shown that the resilience personality is related to perceived stress, anxiety, job burnout as well as to quality of life [9]. Similar conclusions were drawn by McDonald [19] who performed a comprehensive study on personality resources, social support, work organization and resistance in this group of professionals. It has been also noted that the development of coping stress strategies takes place early.

Another area of research focuses on the factors that promote the development of the resilience personality, particularly in people who are exposed to severe stress. It has been determined that social support in soldiers is significantly related to subjective wellness and self-control in a changing environment [28].

Maciejczyk and Liszka [18] used the Coping Inventory for Stressful Situation, based on the theory by Endler and Parker, in 94 policemen. Moreover, they studied the sense of coherence as defined by Antonovsky. There were significant differences between policemen working in different departments. The sense of coherence was positively related to the use of coping strategies that are task-oriented and negatively to those oriented on emotions or avoidance. Policemen working in different departments used different coping strategies in difficult situations depending on their duties. Similarly, they had different levels of the sense of coherence. Task-oriented coping strategies are used most commonly by policemen working in the traffic and prevention departments.

There is also a field of research concentrated on the processual aspect of building-up psychological resources [24]. Quality of care in the early developmental stages and patterns of attachment play an important role in this process [15]. Difficult and traumatic events can activate cognitive schemes (Internal Operational Models by Bowlby). Then, a stressful situation is not experienced as something new but as a recreation of early, unconscious and preverbal, albeit internalized, beliefs regarding relationships or past events. Based on previous research, experiencing the surrounding world

as safe and predictable is associated with an optimal pattern of attachment that develops in close relationships. This gives an individual the ability to perceive world as more stable and organized in face of traumatizing events, which leads to better functioning [23]. Experiencing world as unstable and unpredictable, resulting from childhood attachment patterns, limits the ability to seek social support and help, which leads to poor regulation of emotions and avoidance coping [29]. Therefore, the role of early-acquired cognitive schemes in the development of the resilience personality seems to be important. These schemes model the motivation to and the way in which an individual seeks social support and help. Subsequently, this leads to a sense of stability and safeness in the adult life, also when people are faced with traumatic situations.

In order to better elucidate the phenomenon of resilience, research is carried out into the possible biological factor underlying it. The hypothalamus-pituitary-adrenal axis is a well-studied functional unit that under certain conditions leads to an increased secretion of cortisol, which might be associated with neuronal damage, dysfunction of neurotransmitter reuptake, and receptor desensitization. In contrast, oxytocin, by interfering with the hypothalamus-pituitary-adrenal axis results in a reduction of anxiety, perceived stress and an increased interpersonal trust [16].

In physiological studies, resilient people tend to quickly achieve baseline parameters following a completed task [5,25]. This was shown in 1970s with respect to blood pressure values in men who suddenly lost their jobs – resilient men achieved baseline values quicker, which was associated with a lower cardiovascular risk [13]. Moreover, resilient people have a better capacity to regulate, in response to changes of the external environment, the levels of oxytocin, cortisol, DHEA and corticotrophin-releasing hormone (CRH) [7].

Moreover, resilient people experience positive emotions more intensely at rest as well as in situations that activate positive emotions. Similarly, they experience less intense negative emotions in stressful situations [6].

There is also ongoing research into the ways in which resilient personality traits can be supported and strengthened. Preliminary results of a training of coping with stress and in self-efficacy carried out among physicians in their first year of work are promising – the therapeutic effect was present even 6 months after training completion [17].

Similar results were obtained by Steinhardt [22] who applied a 4-week intervention in physicians with training of resiliency and coping with stress –

participants who underwent the training had significantly better results than the control group.

Every stressful situations force an individual to the performance of a particular behavior. Usually, we undertake various actions by which we can regain control over external events as well as over our own internal emotions. The entirety of behaviors that are undertaken during a stressful situation are termed coping. Coping is an adaptive process that is determined by both primary and secondary appraisal performed by the subject. Moreover, consequences of coping modify secondary appraisal of a threat and the availability of coping resources. Inadequate coping strategies can both deepen the threat and constitute an additional source of stress, especially in extremely difficult and exhausting situations that are associated with the risk of losing one's life or health [2,21].

The research presented herein is part of a larger project based on the concept of the resilience personality. It demonstrates an important aspect of functioning of the individual in face of traumatic events such as disease, exposure to chronic or cyclic stressful stimuli associated with work. In addition to cognitive skills, emotional abilities also seem to play an important role in the process of adapting to threatening and difficult situations as they enable coping with a whole range of emotions.

## SUMMARY

The choice of participants taking part in this study (pilots involved in overseas missions) makes our research particularly important. Our results with respect to the analyzed psychological variables can have an impact on the process of pre-selection of pilots who take part in overseas missions as well as on monitoring of stress during performance of such missions. Moreover, a better understanding of the underlying factors of stress and psychological components that determine efficacious coping with stress and a brisk inhibition of the stress response can help develop more efficient methods of psychological support that can be used before, during, and after overseas missions in order to improve pilots' performance and reduce consequences, both short-term and long-term, of exposure to stress. This, in turn, can lead to an improved safety of performing various tasks during missions. The subject of resilience is difficult, but it is also an interesting research area encompassing genetics, psychology and a large number of factors, both personal and environmental, that can be associated with the development of the resilience personality.

## CONCLUSIONS:

1. Our results can have a significant impact on the process of preselection of pilots for overseas missions as well as on the methods of stress monitoring during performance of such missions.
2. The analysis of our results helps better understand the mechanisms underlying the phenomenon of stress as well as the psychological components determining efficacious coping with stressful situations.
3. In stage I, the level of stress in the studied group was higher in the group of anti-terrorists. In contrast, in stage II – during performance of missions, higher scores on the stress scale were present in pilots.
4. The studied soldiers differed with respect to coping styles used. Pilots had higher scores in scales measuring rational coping styles, whereas anti-terrorists had higher mean scores on the scales measuring coping styles oriented on emotions and avoidance.

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## AUTHORS' DECLARATION:

**Study Design:** Małgorzata Kowalczyk, Agata Orzechowska, Monika Talarowska, Krzysztof Zboralski, Marian Macander, Olaf Truszczyński, Piotr Gałęcki; **Data Collection:** Małgorzata Kowalczyk, Agata Orzechowska, Monika Talarowska, Krzysztof Zboralski, Marian Macander, Olaf Truszczyński, Piotr Gałęcki; **Statistical Analysis:** Małgorzata Kowalczyk, Agata Orzechowska, Monika Talarowska, Krzysztof Zboralski, Marian Macander, Olaf Truszczyński, Piotr Gałęcki; **Manuscript Preparation:** Małgorzata Kowalczyk, Agata Orzechowska, Monika Talarowska, Krzysztof Zboralski, Marian Macander, Olaf Truszczyński, Piotr Gałęcki; **Funds Collection:** Małgorzata Kowalczyk, Agata Orzechowska, Monika Talarowska, Krzysztof Zboralski, Marian Macander, Olaf Truszczyński, Piotr Gałęcki. The Authors declare that there is no conflict of interest.

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