

Stress among Ukrainian and Polish women during the period of Russia-Ukraine war

Authors' Contribution:

-  **A** Study Design
-  **B** Data Collection
-  **C** Statistical Analysis
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Karol Görner ^{1BD}, **Alexandra Predoiu** ^{2AC}, **Ryszard Makarowski** ^{3,4ABDE}, **Inha Petrovska** ^{5AB}, **Andrzej Piotrowski** ^{6,7BC}, **Radu Predoiu** ^{8,9CD}, **Adina Geambaşu** ^{10CD}

¹ University of Presov, Faculty of Sports, Presov, Slovakia

² National University of Physical Education and Sports, Faculty of Physical Education and Sport, Sports and Motor Performance Department, Bucharest, Romania

³ Academy of Applied Medical and Social Sciences in Elblag, Faculty of Administration and Social Sciences, Elblag, Poland

⁴ University of Social and Economics in Gdańsk, Gdańsk, Poland

⁵ Ivan Franko National University of Lviv, Department of Psychology, Lviv, Ukraine

⁶ University of Gdańsk, Institute of Psychology, Gdańsk, Poland

⁷ Pomeranian University in Słupsk Institute of Pedagogy, Słupsk, Poland

⁸ National University of Physical Education and Sports, Faculty of Physical Education and Sport, Teachers' Training Department, Bucharest, Romania

⁹ University of Craiova, Doctoral School of Social Sciences and Humanities, Craiova, Romania

¹⁰ National University of Physical Education and Sports, Faculty of Physiotherapy, Bucharest, Romania

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Abstract

Background & Study Aims:

Russia's attack on Ukraine has caused a sense of threat to safety and existence among the civilian population in both Ukraine as well as Poland. The cognitive aim of the current study was knowledge about the experienced stress levels among women from two different countries – Ukraine (conducting a defensive war against the aggressor) and Poland neighbouring Ukraine.

Material & Methods:

The study was carried out in the summer of 2023 on a sample of Ukrainian women (n = 53), Polish women training combat sports (n = 54), and Polish women non-athletes (n = 73). Stress intensity was measured using the Stress Questionnaire by Makarowski (2022). Empirical variables measures: emotional tension, external stress, intrapsychic stress, fight-or-flight, and mobilization.

Results:

The highest levels of emotional tension, external stress, intrapsychic stress, and the so-called fight-or-flight were reported by the Ukrainian women, while the lowest were reported by the Polish women training combat sports. The highest levels of mobilization were also reported by Polish women training combat sports, while the lowest were reported by Ukrainian women. In the Ukrainian women sample, no statistically significant correlations were observed between mobilization and the four factors of stress that were measured.

Conclusions:

Ukrainian women's war experience leads to the exhaustion of mental resources. Polish women, in particular women training combat sports, have more resources, and thus higher resistance to different types of stressors. It seems necessary to further study stress, post-traumatic stress, and coping among women from these countries, as well as to provide psychiatric and psychological support aimed at reducing the consequences of the experienced stress.

Keywords:

emotional tension • external stress • fight-or-flight • INNOAGON • intrapsychic stress • mobilization

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Author's address:

Alexandra Predoiu, National University of Physical Education and Sports, Faculty of Physical Education and Sport, Sports and Motor Performance Department, 140 Constantin Noica St., Bucharest, Romania; e-mail: alexandra.predoiu@yahoo.com

Athlete – *noun* 1. someone who has the abilities necessary for participating in physical exercise, especially in competitive games and races; 2. a competitor in track or field events [72].

Mental health – *noun* the condition of someone's mind [72].

Combat sport – *noun* a sport in which one person fights another, e.g. wrestling, boxing and the martial arts [72].

Extreme sport – *noun* a sport considered more dangerous and thrilling than ordinary sports and often involving hazardous airborne stunts and tricks [72].

EFPA – 'extreme form of physical activity are extreme sports, often classified according to the environment in which they are performed (water, land, air), extreme form of physical recreation as well as gainful activity or voluntary service, and all varieties of physical activity that meet at least one classification criterion of the feature associated either with extreme risk of injury or death, or extreme body burden with high level of effort, or extreme coordination difficulty' [73, p. 19].

INNOAGON – acronym 'innovative agonology' [46].

Innovative agonology – is an applied science dedicated to promotion, prevention and therapy related to all dimensions of health and regarding the optimization of activities that increase the ability to survive from micro to macro scales [66].

Neo-gladiator – a person who trains mix martial arts (MMA) and similar forms of hand-

INTRODUCTION

The Russia-Ukraine war has claimed the lives of 262 Ukrainian athletes [1]. Hundreds sports facilities have been destroyed. Due to the ongoing war, Ukraine has made the decision to not participate in the 2024 Olympic games in Paris [2]. The war has changed the hierarchy of needs for both Ukrainians as well as the entire world. Self-realization needs, including participating in sports, have been relegated to the background as the need for security became a priority.

Studies carried out six months after the start of the armed conflict have shown that a large part of the Ukrainian population is exhibiting increased levels of anxiety, depression, and stress. It was found that women are more susceptible to mental health problems than men, although younger people are more resilient [3]. In particular, women, children, and older people forced to live in a country engulfed by war are experiencing numerous negative situations, such as the physical destruction of infrastructure, injuries, and witnessing violence and death, among others [4].

Ukrainian women had the opportunity to leave the country already in February 2022, but it was limited only to women with small children. The law required partners and adult children to stay in Ukraine. On February 24, 2022, leaving the country was prohibited for men aged between 18 and 60. The sense of safety and control over the situation, crucial for mental health [5], ceased to exist. Extreme experiences may inhibit the ability to adapt to new conditions, for example, living in a new country or a new place of residence [6].

Few studies on the mental health of Ukrainian citizens during that time are available. Existing studies mostly focus on soldiers in the armed

forces [7]. Young et al. [8] showed that women who have experienced military conflicts both as soldiers as well as civilians suffer significant and long-term mental health consequences. The study by Johnson et al. [9] carried out in 2022 in Ukraine showed that due to internal relocations, 65% of Ukrainian citizens have experienced numerous traumatic events related to the armed conflict. Studies on Ukrainian men and women carried out in Poland show that they experience high levels of anxiety, depression, and sleep problems [10].

Stress is an area in which 'the interaction between psychology and health is most obvious' [11]. Cannon observed that when a person is threatened, physical changes occur (e.g., breathing rate and heart rate are increasing, pupils dilate), consisting of psychological arousal – the thalamus sends signals to the hypothalamus triggering a general fight or flight physiological response, and, also, the cortex receives signals, registering the conscious emotion of fear (however, many brain areas are involved in emotional reactions) [12]. The person, thus, have physical resources to escape from the stressful situation, by running away or by fighting the threat. Organisms with a strong fight or flight response are more likely to survive when threatened [11]. But not everyone, when faced with a stressor, shows the same level of psychological arousal, the cognitive appraisal being very important. Therefore, stress is not just an automatic biological response, the perception of the available psychological, physical and social resources (to deal with the threat) playing an essential role. The Lazarus' [13] cognitive appraisal theory reflects this biopsychosocial approach, being found (in military personnel) that 'cognitive appraisal mediated the relationship between combat exposure

and psychological distress (...) the impact of a potentially stressful event on well-being is contingent on one's appraisal of that event'.

During emergency situations, persons are at high risk of stress-related health consequences, peoples' beliefs about stress itself representing a potential protective factor, influencing the stress-related outcomes [14]. Laferton et al. [15] found that negative stress beliefs predict somatic symptoms, while Daniels et al. [16] are discussing about the influence of negative stress beliefs on negative affect. It seems that distress (perceived in a certain context) is associated with violent behaviours, hostility, sabotage, with frightening consequences in the military environment [17]. In the military context, the psychological stress includes emotional and cognitive stressors (for example, decision making) [18].

Investigating the images used by media during war, Chetty [19] asserts that 'the dominant presentation of women in the media during war tends to disempower and silence women, and fosters a female dependency on male syndrome'. Gregory [20] discusses, also, about women in wartime and the status quo of female positions in society, emphasizing the 'female involvement in the war effort overall'.

The cognitive aim of the current study was knowledge about the experienced stress levels among women from two different countries – Ukraine (conducting a defensive war against the aggressor) and Poland neighbouring Ukraine.

Due to the specificity of the issue, we formulate assumptions regarding the decomposition of this goal into the research question and hypotheses in the next section.

MATERIAL AND METHODS

We base the decomposition of this goal into a research question on forth elementary assumptions. Firstly, the women training combat sports would be better prepared, physically and psychologically, for sudden, difficult, and stressful events. Secondly, resistance to extreme situations such as death or disability due to injury, are impossible to prepare through training in any extreme sport (combat sports fall into this

category). Thirdly, during war, activities qualifying as military skill are extreme forms of physical (psychophysical) activity (acronym EFPA – see glossary) with the highest risk of losing one's life or spending the rest of one's life in disability. Fourthly, since the population of Ukraine is also burdened with stress resulting from such risk (regardless of the threat resulting from the aggressor's permanent attacks on the population and civilian infrastructure), there are no rational premises for examining a sample of the population of Ukrainian women practicing combat sports or other extreme sports.

Research question whether the level of stress significantly differentiates Ukrainian women who do not practice sports and Polish women, some of whom practice combat sports

Hypothesis 1: Ukrainian women will report the highest stress levels, while Polish women training combat sports will report the lowest stress levels.

Hypothesis 2: Ukrainian women will report the highest *mobilization* levels, while non-athlete Polish women will report the lowest *mobilization* levels.

Participants

The youngest participant was 19, while the oldest was 25. All women were of a relatively similar age. Polish women (n = 54) training the following combat sports disciplines: karate (n = 36), kick-boxing (n = 9), and boxing (n = 9). The competitive experience ranged from 2 and 11 years, the average (in the entire sample) being 5.2 years; 22.2% registered national/international sports performances, while 77.7% obtained local/regional level results (taking into account Swann et al. [21] highest standard of performance). The average age of this group of women was 21.57 ±1.83 years.

With respect to non-athlete Polish women (n = 72, age 22.33 ±3.10 years) and Ukrainian women (n = 53, age 20.91 ±0.53 years), they were not involved in systematic physical activities.

Study design

The study was carried out in the summer of 2022 in Ukraine and Poland. A total of 179 women were surveyed, online (using *Google forms* – Google LLC, Mountain View, CA, United States).

to-hand fighting that do not meet the definition of sport according to the Olympic Charter [54].

Dan – noun 1. One of the numbered black-belt levels of proficiency in martial arts such judo and taekwondo. Also called **dan grade**: 2. Somebody who has achieved a dan [72].

Measurements

First, data regarding: age, country, sport discipline practiced, best sports results and competitive experience (in the case of combat sports, were gathered from women participants.

Stress intensity was measured using the Stress Questionnaire by Makarowski [22]. It measured *emotional tension*, *external stress*, *intrapsychic stress*, *fight-or-flight*, and *mobilization*. The description of the five scales of the questionnaire is as follows [22]:

- 1) **emotional tension**, which results from the sense of anxiety and excessive nervousness. It occurs when an individual finds it difficult to relax in various everyday situations. It is related to a lack of energy to act, the feeling of fatigue without any particular reason, as well as the tendency to resign from undertaking various tasks and fulfilling plans. High *emotional tension* triggers a tendency to be highly irritable in interpersonal relationships. Example items from this scale include: 'I get nervous more often than I used to, and for no obvious reason' and 'Although I try to, I have difficulties relaxing'.
- 2) **external stress**, which occurs when an individual is unfairly judged by other people in various social contexts (at home, work) and when their sense of helplessness and exhaustion related to defending their point of view/position increases. *External stress* is experienced when an individual is exploited by others, becomes anxious, frustrated, or fatigued because the expectations or tasks set by others exceed their own resources, skills, and coping abilities. Example items from this scale include: 'I feel drained by constantly having to prove I am right, and "I am criticized too frequently'.
- 3) **intrapsychic stress** is related to the inability to cope with one's own feelings and expectations. A mental system filled with tension and conflict does not require external pressure to experience stress. This kind of stress occurs when an individual has problems with themselves and their still vivid memories from the past, creating symptoms of loneliness and anxiety. Thoughts about the future evoke anxiety, tendencies to resign, and a pessimistic assessment of oneself and the world. Example items from this scale include: 'I keep being bothered

by things that have happened in the past' and 'Thinking about my problems makes it hard for me to fall asleep'.

- 4) **fight-or-flight**. Cannon used the term 'stress' to describe the *fight-or-flight* response (see theories of stress – [11]). In situations of being suddenly attacked, noticing an enemy, or necessary escape from danger, neurotransmitters initiate the stress reaction through the nervous system. The mobilization of the organism during stress, especially during attack, defense, or escape is characterized by, among others, increased heart rate, increased blood pressure, rapid breathing, musculoskeletal tension, widened pupils, and faster cognitive processes. Example items from this scale include: 'I am mobilized, as if I had to suddenly attack my enemy' and 'I am mobilized, as if I saw an apparition or a ghost'.
- 5) **mobilization** is an activity or activation of the organism. To overcome obstacles, the individual needs to mobilize. The process of *mobilization* can be initiated, for example, before a difficult task or during dangerous situations (the motivation can be intrinsic or extrinsic). Example items from this scale include: 'I am mobilized because I have a lot of tasks to carry out' and 'I mobilize myself intensely before a difficult task'.

Each scale of the questionnaire is comprised of five items, and for each item the participants responded with a numerical value: Definitely YES = 5, Definitely NOT = 1, Rather YES = 4, Rather NOT = 2, Hard to say = 3. The instrument has been translated into Ukrainian (from English – see [21]) with the help of the questionnaire author. The Stress Questionnaire was created through retroversion, a procedure used in various researches [23]. The present questionnaire (the Stress Questionnaire) is an expanded version of the Sense of Stress Questionnaire (*Kwestionariusz Poczucia Stresu*) by Plopa and Makarowski [24], which has been used in numerous cross-cultural studies [25-27], to which two more scales have been added.

The reliability of the scales in the current study were as follows: Cronbach's $\alpha = 0.751$ for *emotional tension*, Cronbach's $\alpha = 0.826$ for *external stress*, Cronbach's $\alpha = 0.797$ for *intrapsychic stress*, Cronbach's $\alpha = 0.801$ for *fight-or-flight*, and Cronbach's $\alpha = 0.741$ for *mobilization*.

Statistical analysis

The Statistica 13 software was used for the statistical analyses. ANOVA procedures were used (one-factor analysis of variance) with Tukey's test for unequal sample sizes. The normality of the distributions was verified using the skewness and kurtosis indicators with values between +1.96 and -1.96 (for the normality of data distribution) [28]. Considering the effect size (ANOVA), Cohen's *f* values were reported, the interpretation being: 0.40 = large, 0.10 = small, and 0.25 = medium effect [29], while for Pearson correlation r^2 (the coefficient of determination) was presented, to indicate the magnitude of the associations between variables. $r^2 = 0.25$ represents a strong effect size, $r^2 = 0.09$ reflects a moderate association between variables, and $r^2 = 0.01$ is a weak effect size [30]. The sixth author had an equal contribution to the publication as the first author.

Ethics Statement

Participation in the study was voluntary and anonymous. Each participant gave their informed consent for participating in the study. The study was carried out in accordance with the Declaration of Helsinki and the Polish Psychological Association's guidelines.

RESULTS

All variables were normally distributed. *Emotional tension*, *external stress*, *intrapsychic stress*, and *fight-or-flight* scores were the highest in Ukrainian women, and the lowest in Polish women training combat sports. The highest *mobilization* levels were reported by Polish women training combat sports, while the lowest were reported by Ukrainian women. The analysis of variance shows that the groups significantly differed from one another with respect to the measured variables (Table 1).

Large and very large effect sizes were observed, generally (Table 2).

In accordance with the theoretical assumptions important correlations between *emotional tension*, *external stress*, *intrapsychic stress*, and *fight-or-flight* were observed in all samples. No statistically significant correlation between *mobilization* and the remaining stress variables was observed in the Ukrainian women sample. A high and negative Pearson's *r* coefficient between *mobilization* and *intrapsychic stress* ($r^2 = 0.38$) was observed in the non-athlete Polish women sample (lower limit = 0.454, upper limit = 0.744, 95% confidence interval), along with a weak

Table 1. Differences in stress levels between Polish women and Ukrainian women.

Sample	Emotional tension		External stress		Intrapsychic stress		Fight-or-flight		Mobilization	
	M	SD	M	SD	M	SD	M	SD	M	SD
1. Non-athlete Polish women (n = 72)	8.83	2.14	11.61	3.50	12.04	4.10	8.13	1.67	18.35	2.96
2. Polish women training combat sports (n = 54)	8.33	2.81	8.22	2.36	7.89	1.93	8.11	2.49	21.89	2.58
3. Ukrainian women (n = 53)	14.66	4.38	16.68	4.54	13.72	4.49	12.68	5.02	16.58	3.47
Tukey's test results	F	65.93	90.81		46.00		34.06		51.57	
	p	***	***		***		***		***	
Differences statistically significant	1÷3***; 2÷3***		1÷2***, 1÷3***, 2÷3***		1÷2***, 1÷3*, 2÷3***		1÷3***; 2÷3***		1÷2***, 1÷3**, 2÷3***	

* $p > 0.05$, ** $p > 0.01$, *** $p < 0.001$; **M** mean; **SD** standard deviation; **F** F-distribution; **p** significance level, probability

Table 2. Effect size values for ANOVA (overall and by groups).

Variable	Significant differences between groups	Size values (<i>f</i>)
Emotional tension	overall 1÷3, respectively 2÷3	0.85, 0.74, respectively 0.75
External stress	overall 1÷2, 1÷3, respectively 2÷3	0.92, 0.39, 0.58 respectively 0.91
Intrapsychic stress	overall 1÷2, 1÷3, respectively 2÷3	0.64, 0.47, 0.19 respectively 0.62
Fight-or-flight	overall 1÷3, respectively 2÷3	0.61, 0.55, respectively 0.52
Mobilization	overall 1÷2, 1÷3, respectively 2÷3	0.69, 0.48, 0.24 respectively 0.67

Note: Cohen’s *f* = 0.40 indicates a large effect size, **1** non-athlete Polish women (*n* = 72), **2** Polish women training combat sports (*n* = 54), **3** Ukrainian women (*n* = 53)

correlation between *mobilization* and *emotional tension* ($r^2 = 0.08$) in Polish women training combat sports (lower limit = 0.014, upper limit = 0.509). However, a moderate positive correlation occurred between *mobilization* and *fight-or-flight* ($r^2 = 0.12$) in non-athlete Polish women (lower limit = 0.129, upper limit = 0.538), while in Polish women training combat sports, the correlation between *mobilization* and *intrapsychic stress* was weak ($r^2 = 0.07$, lower limit = 0.003, upper limit = 0.501) (Table 3).

DISCUSSION

By definition, war creates a sense of harm, powerlessness, stress, and loss of all types of resources in civilians [31]. Studies carried out in March 2022 on Ukrainian soldiers found early signs of anxiety, depression, and insomnia [32]. A significant lowering of wellbeing was noticeable already at the beginning of the military activities. The transactional conceptualization of stress (Lazarus and Folkman [33]) highlights that subjectively experienced stress is the results of a transaction

Table 3. Pearson’s *r* coefficients between the measured stress variables in the samples of Polish women and Ukrainian women.

Sample	Variable	Emotional tension	External stress	Intrapsychic stress	Fight-or-flight
Non-athlete Polish women (<i>n</i> = 72)	external stress	0.96***			
	intrapsychic stress	0.85***	0.83***		
	fight-or-flight	0.65***	0.61***	0.47***	
	mobilization	ns.	ns.	-0.62***	0.35*
Polish women training combat sports (<i>n</i> = 54)	external stress	0.74***			
	intrapsychic stress	0.34***	0.62**		
	fight-or-flight	0.43***	0.32***	ns.	
	mobilization	-0.28*	ns.	0.27*	ns.
Ukrainian women (<i>n</i> = 53)	external stress	0.46***			
	intrapsychic stress	0.62***	0.65***		
	fight-or-flight	0.65***	0.56***	0.65***	
	mobilization	ns.	ns.	ns.	ns.

p* > 0.05, **p* < 0.001; ns. not statistically significant

between the individual and their environment. Negative stress (distress) will result if the person appraises the transaction as surpassing his/her inner resources/ coping skills. Harm, loss, threat, may be the consequence of stressful transactions, and they imply sadness, regret, worry, fear, and anger. To overcome difficult situations, the person needs to mobilize, the organism being, thus, prepared to intensify mental and physical exertion [22], to activate energy [34].

In the current study, we confirmed our first hypothesis, stating that the highest levels of *emotional tension*, *external stress*, *intrapsychic stress*, and the so-called *fight-or-flight* would characterize Ukrainian women, while the lowest levels of these variables would characterize Polish women training combat sports. This is likely due to the direct threat to Ukrainian women's life and health.

Differences in *emotional tension* and *fight-or-flight* between Polish women training combat sports and non-athlete Polish women were not statistically significant. These samples differed with respect to *external stress*, *intrapsychic stress*, and *mobilization*.

Hypothesis 2, stating that the highest levels of *mobilization* will characterize Ukrainian women, while the lowest levels of this variable will characterize non-athlete Polish women, was not confirmed. We assumed that Ukrainian women will select the optimal strategy of coping during the war, namely, mobilization. However, the highest levels of *mobilization* were reported by Polish women training combat sports. Naturally, these women were aware of the war beyond Poland's borders and implemented an active, rather than passive, method of coping. This does not mean that the Ukrainian women were not mobilized to cope, but rather, they probably used emotional coping techniques. It is worth noting that in Table 3, no statistically significant correlations between *mobilization* and the four stress variables were observed in the Ukrainian women sample. However, additional studies on strategies used by women in these three samples during wartime would be worthwhile. In the non-athlete Polish women sample, a statistically significant, high, and negative correlation was observed between *intrapsychic stress* and *mobilization*. This means that the higher the *mobilization* levels, the lower the *intrapsychic stress* levels. In the same sample,

a medium, positive correlation between *mobilization* and *fight-or-flight* was observed. This is in line with Walter Cannon's theory that *mobilization* during stress leads to preparedness for the so-called *fight or flight* [35].

Miller et al. [36] showed that daily stressors are a better predictor of women's mental health than traumatic war experiences, with the exception of post-traumatic stress. Other studies showed that women suffering from breast cancer reported more traumatic war experiences than did women in the control group [37]. In turn, Wright et al. showed that exposure to war is related to a higher risk of asthma in older civilians [38], while Saile et al. [39] claim that traumatic war experiences increase violence against children. Wars increase the chances of post-traumatic stress disorders, anxiety disorders, depression and suicide in people exposed to them [40]. And the negative effects are felt over the long term – 'the impacts of the war (...) are still perceptible in the discourse of parents to children even years after the experience' [41].

The war in Ukraine has impacted the wellbeing of citizens in many European countries who worry about the conflict's spread [42]. Modern television, internet, and social media show the events in Ukraine virtually constantly. On the one hand, this leads to habituation in some individuals, while on the other, it causes strong negative emotions in others. The risk remains very real for European citizens, especially in countries bordering Ukraine [43].

Our study has several limitations. First, participants were recruited via an online questionnaire. This was a practical and safe solution considering the war situation. Participants in online studies are more frequently younger and better educated [44]. Second, the cross-sectional character of the current study prevents making causal inferences. Third, the samples were unequal, which may have impacted the statistical power of the used methods. Also, military activities vary in their intensity across Ukraine, thus, the Ukrainian sample could have achieved more varied results. Not least, the findings could be different if martial arts athletes and non-athletes from other countries neighbouring Ukraine, such as Romania, Slovakia, Hungary or Republic of Moldova, would be examined. Future research should focus, also, only on men.

In this work we do not use the term 'martial arts', although according to the combat sports theory 'every combat sport is martial arts but not vice versa' [45, p. 18]. We identify with the views of scientists (recognized experts – as they claim – the ephemeral 'science of martial arts') promoting the new applied science INNOAGON (see glossary) [46]. In the light of the arguments of INNOAGON experts, the use of the term 'martial arts' in scientific journals is promoting the neogladitorial phenomenon in the field of science – media expansion (paradoxically, mainly through sports channels) takes place under the camouflaged name of 'mixed martial arts'. Meanwhile, the social mission of science is, among other things, counteracting all pathologies [47]. A similar view is expressed by the authors of the latest and previously published works (pre-dedicated 'agonology') in the journals *Archives of Budo* [48-55] and *Archives Budo Science of Martial Arts and Extreme Sports* [56-62], as well as in the AHFE monographs [63, 64] – especially in *Healthcare and Medical Devices* [65-70]. Also noteworthy are the results of Ryszard Kałużny's simulation research [71] (in the discussion, the author refers to social aspects in the context of the war in Ukraine), as well as the paradox that the main

perpetrator of Russia's aggression against Ukraine is a holder of the 8th dan degree in judo [47].

CONCLUSIONS

Ukrainian women reported the highest stress levels (*external stress, emotional tension, intrapsychic stress*, and in the case of the so-called *fight-or-flight*), while Polish women training combat sports reported the lowest stress levels. Ukrainian women's war experience leads to the exhaustion of not only physical and financial, but above all, mental resources. Polish women, in particular women training combat sports, have more resources, and thus higher resistance to all sorts of stressors, including such significant ones as war stressors. Long-term psychological and social consequences of the armed conflict should be expected both among Ukrainian as well as Polish women. Psychiatric and psychological support should consider long-term influences on women, as well as their significant others, children, and parents. People with disabilities should also be given consideration. Thus, monitoring women's mental health, including stress levels, coping, and various resources such as, for example, resilience, should continue long after the war ends.

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