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COMPARATIVE ANALYSIS OF PSYCHOPHYSIOLOGICAL ADAPTATION LEVELS AMONG UKRAINIAN AND SPANISH STUDENT YOUTH

Relevance. *Psychophysiological adaptation is regarded as an integral process of maintaining vitality, serving as a foundation for both health and organism functioning. An adequate level of psychophysiological adaptation is essential for successful academic achievement and social, professional, and university life, and is therefore relevant to all learners, regardless of their nationality or the country in which they study. So far, the most researched aspects of adaptation in education are social, mental, and psychological. However, psychophysiological components of adaptation in educational environments remain insufficiently understood. This issue is especially relevant in Ukraine, where students must endure martial law conditions, chronic stress, frequent air raid alerts, changes in learning formats, and increased information loads.*

Contemporary research confirms the negative impact of these factors on the mental and physiological states of young students. It is therefore important that comparative analysis of the psychophysiological adaptation levels of higher education students in Ukraine (who must defend themselves against Russia's unprovoked full-scale invasion) and Spain (where students live in peaceful conditions) may help to establish the threshold for physiological mechanisms, beyond which maladaptation processes commence. This could facilitate the development of new approaches to planning academic workloads and educational trajectories, enhance intersystem connections of the organism as a basis for life, and reduce the risk of unwanted psycho-neurological states.

The aim of the study *was to determine the features of psychophysiological adaptation (PA) among young students in Ukraine and Spain, to carry out a comparative analysis of their adaptive processes' levels, and to develop practical recommendations for improvement..*

Materials and Methods. *To assess levels of psychophysiological adaptation (PA), an original computer programme "Integral Assessment of Human Psychophysiological Adaptation" (CP IAHPA) was utilised. This involved evaluating psychological and physiological indicators: reactive (RA) and personal (Pers.A) anxiety; vestibular function (VF) via the sensitising Romberg test; the tapping test (TT) by Ilin; heart rate (HR) via photoplethysmography; systolic (SBP) and diastolic (DBP) blood pressure; psycho-emotional colour (CP) and sound perception (SP). Statistical processing of the obtained data was performed using MS Excel 2010 software.*

Results. *A strong negative correlation was found between PA level and RA, Pers.A, HR, SBP, DBP. Ukrainian students were found to have a higher proportion of individuals with low and critically low levels of PA, which was associated with increased RA, Pers.A, poorer VF, TT, CP, and SP compared to Spanish students ($p < 0.001$). The strong negative correlation between PA level and RA, Pers.A, HR, SBP, and DBP were confirmed.*

Conclusions. *The lower PA among Ukrainian students compared to Spanish ones is associated with martial law, which has imposed chronic stress combined with intensive academic workload, sleep deprivation, unhealthy habits, and poor diet. The obtained results provided a foundation for a range of practical recommendations for psychological assistance and optimising the educational environment during war and in the post-war period.*

Keywords: *psychophysiological adaptation, stress resistance, anxiety, stress, student youth.*

Introduction. The problems of psychophysiological adaptation, stress resistance, and the ability of student youth to obtain higher education in today's academic activity context are of great interest to both Ukrainian and international researchers [1, 5, 8, 12]. The relevance has grown particularly in Ukraine due to the rapid increase in social-psychological stress following Russia's full-scale unprovoked invasion. Since February 2023, Ukrainian students have experienced constant factors such as frequent lengthy air raid alarms, direct threats to life and health, chronic sleep deprivation, all combined with a high pace of education, significant intellectual loads, changes in learning formats (including remote and blended learning), and strict academic requirements.

There is no doubt that the level of psychophysiological adaptation of student youth is critically important for academic and professional success and for maintaining physical, mental, and psychological health [1, 4, 5]. Under conditions of martial law, more than three years of chronic stress, and increased information pressures, the problem of adaptation is of particular urgency for Ukrainian students [1,8].

Global experience confirms the significant impact of stress and anxiety not only on cognitive but also on physiological functions (Alhawari et al., 2023 [2]; Holubnycha et al., 2022 [5]; Juan Camilo Benítez-Agudelo et al., 2025 [8]). It is known that chronic anxiety and real threats cause dysregulation in the autonomic nervous system and motor sphere (Heimhofer et al., 2024 [4]), as well as poorer psychoemotional states and reduced performance among students (Ołpińska-Lischka et al., 2021 [3]; Mozolev, 2023 [6]).

Comparing Ukrainian higher education students with their Spanish counterparts offers a unique opportunity to evaluate the extent to which chronic extreme stress affects the real psychological and physiological adaptation mechanisms in young people. Effective psychophysiological adaptation is an integrated indicator of a person's ability to overcome distress factors and maintain a balance between inner reserves and the external demands of the educational process [4, 7, 11]. Impairment of adaptation poses a risk of chronic stress development, increased anxiety, neurological and somatic disorders, and reduced academic performance and socialisation [5,9,6].

Despite numerous studies on adaptation processes among young people during the study [5, 7, 15], the literature does not report comparative analyses of psychophysiological adaptation between Ukrainian students and those from other nations under the contemporary realities of the educational process, where Ukrainians face subjectively and objectively more complex conditions linked to martial law. Therefore, researching key factors that determine student adaptation in different countries, including under full-scale invasion and chronic stress, is highly relevant and valuable for understanding physiological and psychological life mechanisms. Such insights may expand the foundations of understanding psychophysiological traits, potential causes of adaptation disorders, and help develop rehabilitation approaches and preventive strategies against pathological states induced by chronic stress [1, 8].

Statement of the problem and purpose of the study. In recent years, there has been growing interest in research on student psychophysiological adaptation in the context of educational, war-related, and migration stressors [5, 6, 7, 8]. Many works by both Ukrainian and international scholars are devoted to the study of psychophysiological adaptation, stress impact, and stress resistance. Notable modern authors include M. Makarenko, M. Makarchuk, V. Lysohub, L. Yukhymenko, S. Khomenko, O. Kokun, L. Holubnycha, H. Alhawari, C. Heimhofer, J.C. Benitez-Agudelo, and others.

Psychophysiological adaptation is understood as the dynamic process by which the human organism adjusts to new or altered environmental conditions, coordinating nervous, endocrine, and other physiological systems with psychological mechanisms regulating behaviour [5, 12]. New, extreme, or changed environments are perceived by the organism as stress. According to the literature, stress is a state arising in response to adverse factors (stressors) and accompanies mobilisation of psycho-somatic and functional protective and adaptive mechanisms [5, 7, 12, 17]. Stress is most often associated with increased anxiety – a negative emotional state triggered by anticipating danger or uncertainty, characterised by tension, worry, various physiological symptoms across organs and systems, and direct influences on the cognitive sphere [1, 2, 4, 8].

The concept of stress resistance closely correlates with psychophysiological adaptation. Stress resistance is considered a set of individual traits and personal characteristics that provide effective regulation of emotional states and minimise the negative impact of stressors on the human organism [8, 12].

An analysis of recent scientific studies indicates that chronic stress and anxiety have a powerful impact on the psychophysiological state of young students. [2, 8, 9]. During the COVID-19 pandemic and especially following Russia's full-scale invasion of Ukraine, rates of anxiety, stress, and prevalence of cardiovascular, autonomic, and cognitive disorders have significantly increased – most notably among students pursuing higher education [12, 14, 15].

Research by Spanish and other foreign scientists confirms that the educational environment itself is a source of stress for students due to the intensity of study programs, high competition, and frequent changes in study requirements [3, 13]. Empirical studies show that individual differences in students' stress resistance, reactive and personal anxiety, performance, and the regulatory function of the autonomic nervous system determine their success in adapting to academic activities [4, 7, 11].

Holubnycha et al. (2022) emphasize that the adaptation of foreign students to a new sociocultural environment is accompanied by potential psychophysiological changes, among which increased anxiety and sleep disturbances occupy a special place [5]. Alhawari et al. (2023) investigated the effect of exam stress on cardiovascular indicators and proved that increased anxiety is accompanied by an increase in heart rate and changes in blood pressure [2]. Vergelec T. (2022) notes that distance / online learning contributes to a decrease in social support and an increase in stress and anxiety levels [7]. Heimhofer et al. (2024) and J.C. Benítez-Agudelo et al. (2025) emphasize the negative impact of anxiety on motor performance, coordination, and reactivity in the tapping test of young people from different countries [4, 8].

The authors' research results indicate that in conditions of extreme events (war, epidemics, forced population migration, etc.), psychophysiological adaptation resources are depleted much faster [1, 5, 13]. The reserves of adaptive capabilities were found to be particularly weakened among Ukrainian student youth currently living in a country that is undergoing a full-scale invasion and constant exposure to the negative factors caused by it [1, 10, 12].

Ukrainian and foreign scientists have demonstrated in their studies that anxiety, sleep disturbances, destabilization of somatic functions, and decreased cognitive potential are associated with the risk of developing disadaptation and even psychosomatic disorders [1, 4, 9, 15]. Mozolev (2023), in a large-scale analysis of Ukrainian student youth, demonstrates a trend toward deterioration in physiological and psychological indicators for the period 2020–2023, especially during a full-scale invasion [6].

Thus, the work of modern scientists confirms the importance of studying the psychophysiological adaptation mechanisms of students as a complex integrative phenomenon that is formed under the influence of a number of external and internal factors.

The purpose of our research was to compare and characterize the peculiarities of psychophysiological adaptation of higher education students in Ukraine and Spain. In accordance with the stated goal, the main tasks of the work were:

- to conduct a comparative analysis of the features of psychophysiological adaptation of student youth in Ukraine and Spain, to establish the levels of psychophysiological adaptation in the conditions of educational activity and to identify the main differences;
- to identify the leading factors that influence the psychophysiological adaptation of student youth in the learning process, taking into account chronic stress, trigger factors (death of a loved one due to military operations, air raid alarms, change of residence, etc.) and individual psychophysiological indicators;
- develop practical recommendations for appropriate rehabilitation measures.

Organisation and methods of the study. The study was conducted during 2024-2025. Data collection in Spain was carried out as part of the Erasmus+ KA171 international mobility program for PhD students. The total number of respondents was 180 practically healthy (without chronic diseases) higher education students of 1st-4th courses (90 Ukrainians and 90 Spaniards), aged 17-28, of both sexes. The collection of factual data in Spain was carried out at the Faculty of Nursing of the University of Valladolid (Castile and León). Among the respondents from Ukraine, the study included students of various specialties from the educational and scientific institutes of Physical Culture, Sports and Health (non-athletes), International Relations, History and Philosophy, and the faculties of Computer Engineering, Intelligent and Control Systems, and Psychology.

In accordance with the set purpose, the individual level of psychophysiological adaptation (PA) was determined using our proprietary computer program "Integral Assessment of Human Psychophysiological Adaptation" (CP IAHPA) with the use of computerized diagnostic tests. For this purpose, the following psychophysiological indicators of reactive (RA, points) and personal (Pers.A, points) anxiety were measured using the Spielberger-Khanin scale [16], vestibular function (performance of the Romberg sensitization test, VF, sec), tapping test (modernized computerized version of Ilin test, TT, signs/sec), HR (by photoplethysmography, HR, bpm), systolic and diastolic pressure (SBP and DBP, respectively, mm Hg), color and sound perception (CP, SP, conditional units – c.u.) [10]. The CP IAHPA allowed for a multicomponent assessment of the psychophysiological adaptation of the study participants, avoiding routine operations of long-term processing of primary data due to special mathematical calculation methods, made it possible to take into account the degree of psycho-emotional perception, the probable reactivity of the body to stressful situations, and contributed to the formation of an idea about the neurological status of the examinee. [9]

The individual PA level of each participant was calculated automatically by the program in conditional units (c.u.). According to the program algorithm, it was possible to distinguish four PA levels: high (56.00–70.00 c.u. and above), medium (49.00–55.99 c.u.), low (40.00–48.99 c.u.), and critically low (30.00 and below – 39.99 c.u.). Based on the analyzed indicators, a final conclusion and individualized probable prognosis of the psychophysiological state of each examined person were automatically generated. At the end of the examination, the CP IAHPA provided general recommendations for each of the possible PA levels regarding the optimization of a person's psychophysiological status and probable ways to achieve them.

The processing and analysis of the research results were carried out using descriptive parametric statistics with the MS Excel 2010 software package. Since the obtained data followed the normal distribution law (Shapiro-Wilk test), we used Pearson's correlation analysis. The reliability of changes and differences between the compared values was assessed using Student's t-test. Differences were considered statistically significant at $p \leq 0.05$.

The study complied with the requirements of the Helsinki Declaration (1975, 1996-2013) with the voluntary informed written consent of each volunteer participant. The results of the study were used anonymously for scientific purposes only.

The results of the study and their discussion. We conducted a study of psychophysiological indicators in Ukrainian and Spanish sampling groups (Table 1).

Table 1.

Quantitative values of the studied psychophysiological indicators of higher education students in Ukraine and Spain (mean ± SD)

Indicator	Groups of study participants		Student's t-test	p-value
	Ukrainians	Spaniards		
RA, points	46.2±8.7	37.1±7.5	6.81	<0.001
Pers.A, points	57.6±8.5	45.0±7.6	6.87	<0.001
HR, bpm	110.2±11.4	91.3±12.5	8.81	<0.001
TT, signs/sec	3.64±0.57	5.09±0.71	-13.0	<0.001
VF, sec	2.09±0.73	7.21±4.52	-12.2	<0.001
SBP, mm Hg	146.1±10.5	122.7±10.6	12.8	<0.001
DBP, mm Hg	98.2±7.1	80.0±7.3	13.4	<0.001
CP, c.u.	0.71±0.14	1.18±0.26	-14.1	<0.001
SP, c.u.	0.57±0.14	1.02±0.21	-15.2	<0.001

Notes: mean – average value; SD – standard deviation; p-value – level of significance of differences $p < 0.001$

As can be seen from the table, the average values of the groups of research participants we studied differed significantly from each other. It is noteworthy that Ukrainian student youth had significantly higher RA, Pers.A, HR, SBP, and DBP values and, at the same time, relatively lower TT, VF, CP, and SP values ($p < 0.001$).

These results suggest that there is a risk of developing disorders in the adaptive mechanisms that have developed under the influence of stress. It should be noted that we found similar tendencies in the works of J. C. Benítez-Agudelo et al. (2025), which proved the negative impact of constant stress and sleep disorders on HR, blood pressure, and anxiety levels, as well as on the academic performance of students [8]. Similar negative trends in psychophysiological status are described in the publications of Herber et al. (2025), who emphasize that prolonged stress and emotional dysregulation cause significant changes in cardiac activity and difficulties in the learning process [15].

We divided the participants in each sampling group according to their PA levels (Fig. 1). As can be seen from the figure, the proportion of individuals with critically low and low PA levels in the Ukrainian sample was significantly higher than that among Spanish students ($p < 0.05$). At the same time, among the contingent of surveyed young people in Spain, the number of individuals with medium and high PA levels was significantly higher than among Ukrainian students ($p < 0.05$). In addition, the surveyed Spanish higher education students did not form a group with critically low PA level, as extremely low psychophysiological indicators were found in only one person. This once again confirms that the significant tendency of the Ukrainian sample towards low and critically low PA levels may be associated with high levels of chronic stress caused by the full-scale military invasion of the country.

It is likely that chronic stress, constant anxiety, psychological tension, and worry about one's own life and future against the backdrop of the overall intensity of the educational process were the main triggers for the large proportion of students with critically low and low PA levels in the Ukrainian sample. The literature contains data consistent with our results [1, 4, 12].

For a more detailed study of the psychophysiological characteristics of the groups we surveyed in both countries, we conducted a comparative analysis of their PA indicators (Table 2).

It should be noted that all indicators followed the normal distribution law in each of the samples, which is confirmed by the Shapiro-Wilk normality test ($P > 0.05$). The obtained results show that in Ukrainian students, most of the studied indicators (RA, Pers.A, HR, SBP, DBP, TT, VF) were significantly higher in individuals with low PA levels than in a similar group of Spanish participants. The CP and SP indicators also showed a clear tendency toward reduced color and sound perception properties in Ukrainian students compared to Spanish students.

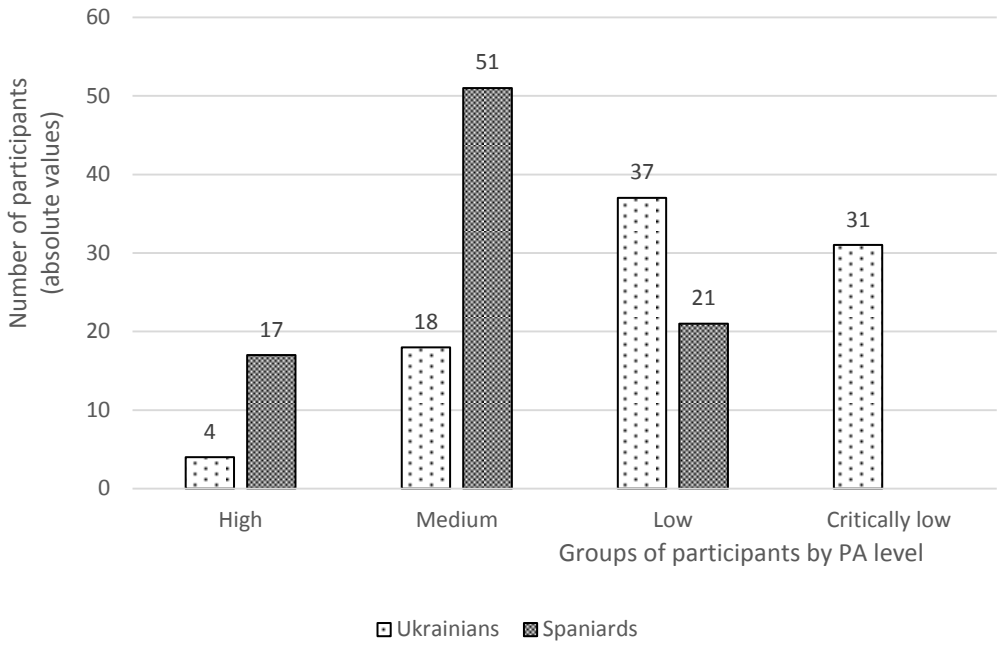

Fig. 1. Quantitative distribution of study participants by PA levels; * - significance of differences $p \leq 0.05$.

Table 2.

Indicators of the studied parameters of the student youth of Ukraine and Spain with different levels of PA (mean ± SD)

Indicator	Levels of psychophysiological adaptation of the study participants			
	High	Medium	Low	Critically low
	Ukrainians			
RA, points	32.5±4.9	38.3±6.1	44.6±5.4*	53.8±7.6*
Pers.A, points	42.2±5.7	48.9±5.0	57.9±3.1*	65.2±4.9*
HR, bpm	91±2.9	97±4.9	107±8.3*	116±7.2*
TT, signs/sec	5.12±0.15	4.61±0.34	3.94±0.28*	3.20±0.17*
VF, sec	3.13±0.29	2.61±0.45	2.00±0.41	1.52±0.28
SBP, mm Hg	132±6	138±5	146±8*	155±7*
DBP, mm Hg	86±2	90±3	97±5*	107±4*
CP, c.u.	0.98±0.10	0.89±0.14	0.75±0.11*	0.60±0.09*
SP, c.u.	0.87±0.06	0.80±0.15	0.62±0.11*	0.44±0.11*
	Spaniards			
RA, points	34.3±4.1*	36.8±4.9*	41.9±6.2	-
Pers.A, points	39.3±3.8*	42.1±4.1*	46.1±5.2	-
HR, bpm	84.2±3.7*	87.1±5.1*	89.7±7.0	-
TT, signs/sec	5.61±0.22*	5.33±0.42*	5.08±0.38	-
VF, sec	14.32±3.98*	11.12±4.21*	6.53±2.84	-
SBP, mm Hg	123.3±7.9*	127.2±8.2*	124.2±7.4	-
DBP, mm Hg	76.0±2.9*	78.4±3.8*	77.3±3.2	-
CP, c.u.	1.52±0.20*	1.48±0.19*	1.44±0.14	-
SP, c.u.	1.38±0.18*	1.31±0.16*	1.21±0.19	-

Note: * - significance of differences $p \leq 0.05$ compared to the similar level of Spaniards.

Our results are consistent with those of Heimhofer et al. (2024), who showed that even minimal changes toward increased chronic stress cause a decrease in sensorimotor reaction speed in

young people [4]. At the same time, Alhawari et al. (2023) emphasize the relationship between anxiety and increased blood pressure and heart rate in medical students (especially during the exam period) [2], which confirms the relevance of the results obtained in Ukrainian students.

This probably indicates that Ukrainian students are in a more severe degenerative psychophysiological state, manifested in increased personal anxiety, decreased sensory-motor reactivity, increased heart rate, and higher blood pressure. This may be the result of constant exposure to chronic stress caused by the conditions of martial law. Similar data were obtained by Holubnycha et al. (2022) [5] and the results of sociological surveys in Ukraine [13].

Thus, it should be assumed that adaptation mechanisms are extremely sensitive to the effects of stress. We emphasize that the insufficient psychophysiological adaptation of Ukrainian students was most evident in the group of individuals with low PA levels, meaning that they were overly sensitive to the effects of chronic psychosocial stress. This confirms the hypothesis of the direct influence of martial law conditions and related anxieties against the backdrop of academic stress during higher education and the existence of additional psychogenic factors that affect the physiological and mental status of students. This probably played a significant role in the prevalence of low and critically low PA levels among Ukrainian students. At the same time, the large majority of Spanish students had average PA levels, and a significantly higher number of respondents had high PA levels.

To identify and verify the strength of the relationship between the studied psychophysiological indicators and the PA level, determine the degree of reliability and the psychophysiological parameters that most influence the PA level, we used correlation analysis (Table 3).

The results of the correlation analysis showed that Ukrainian higher education students had significantly worse scores on all psychophysiological indicators studied compared to their Spanish peers. Particular attention is drawn to the established and dense negative correlation between PA level and anxiety indicators (RA, Pers.A), HR, and SBP, which emphasizes the "interdependence" of the psychological and physiological properties of the body in adaptive changes under conditions of chronic stress. Thus, correlation analysis showed that the lower the PA level, the higher the anxiety, the level of functioning of the cardiovascular system (HR, blood pressure), and the greater the indicators of sensory-motor reactivity.

Table 3.

Correlation analysis of indicators of studied higher education participants in Ukraine and Spain

Indicators	Groups of study participants			
	Ukrainians		Spaniards	
	r (Pearson)	p-value	r (Pearson)	p-value
TT, signs/sec. – PA c.u.	0.62	<0.05	0.52	<0.05
VF, sec. – PA c.u.	0.59	<0.05	0.47	<0.05
RA, points – PA c.u.	-0.74	<0.01	-0.64	<0.01
Pers.A, points – PA c.u.	-0.64	<0.01	-0.58	<0.01
HR, bpm – PA c.u.	-0.65	<0.05	-0.48	<0.05
SBP, mm Hg – PA c.u.	-0.61	<0.05	-0.43	<0.05
DBP, mm Hg – PA c.u.	-0.56	<0.05	-0.36	<0.05
CP, c.u. – PA c.u.	0.49	<0.05	0.37	<0.05
SP, c.u. – PA c.u.	0.41	<0.05	0.33	<0.05

Notes: r – correlation coefficient (Pearson); p-value – level of significance of differences.

The established relationships confirm that the lower the level of adaptation, the more sensitive a person becomes to stressful events, which activates the heart and brain, creating the risk of autonomic imbalance. The results of the survey of modern youth demonstrate that psycho-emotional and cognitive overload, chronic stress, and constant anxiety can determine the quality of psychophysiological adaptation. At the same time, the positive correlations between TT, VF, CP, and SP indicators and the PA level ($p < 0.05$) indicate a situation that is dangerous for life. After all,

the quantitative values of these psychophysiological indicators in Ukrainians were critically lower compared to the Spanish sample [9, 11, 13, 14].

As can be seen, anxiety (RA, Pers.A) had the greatest influence on the formation of the level of psychophysiological adaptation, where the degrees of correlation with PA were the highest, as well as the functional capabilities of the heart (HR, SBP). A significant role in the adaptation processes was played by a person's ability to maintain body balance and space orientation, sensory-motor reactivity (TT, VF). At the medium density level, there were connections between PA and the ability to perceive colors and sounds as a reflection of a human's formed stable emotional and personal associations, which signal self-confidence, self-satisfaction, belief in one's abilities, sensitivity to external influences, etc. [18].

The authors confirm that a decrease in adaptive reserves during chronic stress is associated with the disorganization of brain homeostasis, an imbalance in autonomic regulation of functions, and impaired sensory processing (color and sound perception), which, according to current understanding, leads to an increased risk of developing anxiety, depressive, and neurotic disorders and entropy in students [4, 9, 12, 15, 17]. The authors report that the most significant contribution to the formation of PA levels is provided by indicators of anxiety, heart rate, blood pressure, TT, and VF (Alhawari et al., 2023 [2]; Heimhofer et al., 2024 [4]).

Thus, our results confirm significant changes in the psychophysiological adaptation of Ukrainian higher education students under the influence of chronic stress caused by the state of war in the country and the associated anxiety, prolonged anticipation of danger, and unpredictable situations, combined with high academic demands, blended and distance learning formats, large volumes of educational material, an intense pace of study, and highly complex academic material.

Along with increased anxiety about their lives and the safety of their loved ones, chronic sleep deprivation, possible manifestations of irrational nutrition, frequent cases of excessive consumption of tonic drinks, energy drinks, and an increase in harmful habits among modern students in both countries can provoke a significant decrease in PA levels, the development of various negative psychological and physiological complications and diseases (Koval et al., 2025 [1]; Mozolev, 2023 [6]; Juan Camilo Benítez-Agudelo et al., 2025 [8]). Stress contributes to an increase in reactive and personal anxiety, inadequate sensory-motor reactivity, deterioration of vestibular function, increased heart rate, and a decrease in psycho-emotional perception mechanisms [2-5, 8].

The data from our study indicate the existence of dangerous levels of anxiety among Ukrainian students, which are significantly higher than those of their Spanish peers. This was revealed in the significantly worse PA levels of Ukrainian youth ($p < 0.001$) across all psychophysiological indicators we examined. The results of our work are consistent with the works of other scientists, in particular L. Holubnych et al., 2022 [5], Belov et al., 2020 [15], J.C. Benítez-Agudelo et al., 2025 [8]. Therefore, this situation requires targeted support and rehabilitation measures that can prevent the predicted increase in cases of stress disorders, emotional response disorders, or exacerbations of chronic diseases.

In our opinion, the introduction of such innovative monitoring measures for PA, which we conducted in our study and propose to implement periodically during university education, can contribute to the optimization of functional status, improvement of mental hygiene, psychological support, and social adaptation of students, especially in the context of such extreme situations accompanying the state of war in the country.

We have developed recommendations for rehabilitation measures aimed at improving the PA level of Ukrainian youth and enhancing their mental and physical health. These include the following activities:

- *Information support*
  - conducting regular training sessions on developing stress resistance;
  - creating information stands and leaflets on psychological self-help and stress recognition.

- *Psychological consultation and support*
  - expanding consulting assistance provided by university psychologists;
  - introducing support groups for students who have experienced acute stress / trauma.
- *Training sessions on developing emotional intelligence and self-regulation.*
  - conducting master classes on relaxation and meditation techniques;
  - teaching anxiety management methods.
- *Physical activity and a healthy lifestyle*
  - encouraging students to join sports clubs based on their interests or group fitness classes, aerobics, yoga, etc;
  - supporting programs for establishing healthy sleep and eating habits.
- *Social support and creation of a safe environment.*
  - development of student self-government and communication clubs;
  - organization of leisure activities and creative projects to strengthen social cohesion.
- *Monitoring and evaluation of PA*
  - regular psychophysiological diagnostics for timely identification of risk groups;
  - provision of individual recommendations based on monitoring results.

Thanks to a systematic approach and the implementation of the above measures, a gradual decrease in anxiety levels, increased stress resistance, and improved overall PA among students is predicted.

Conclusions. Our research revealed significant differences in the levels of psychophysiological adaptation among higher education students in Ukraine and Spain:

1. A significantly higher part of individuals with low PA levels were found among Ukrainians. They are characterized by high anxiety and significantly worse VF, TT, CP, and SP scores compared to Spaniards ($p \leq 0.05$).
2. It was found that the main factors determining PA level are RA, Pers.A, HR, SBP, DBP (a direct negative correlation r from -0.56 to -0.74, $p < 0.05$-0.01), as well as TT and VF (direct positive correlation r 0.59-0.62, $p < 0.05$).
3. In the Ukrainian sample, low PA level are directly related to chronic stress caused by war, air raid alerts, and excessive psychological stress combined with an intensive learning process, significant amounts of academic material, and intense mental activity. The combination of a number of factors causes low PA among students and requires urgent and immediate action to improve mental and physical health, as well as the development of new ways and methods to prevent and rehabilitate psychophysiological disorders and complications, reduce anxiety levels, and increase PA.
4. Practical recommendations have been developed for rehabilitation measures aimed at improving the PA level of students, including information, psychological, and social support, systematic monitoring and assessment of PA, training in emotional intelligence, self-regulation, and increasing physical activity and leading a healthy lifestyle.
5. The use of the CP IAHPA can be useful in preventive psychophysiological testing of students, identifying individuals who need individual support, and increasing the diagnostic informativeness of monitoring psychophysiological functions.
6. The results of the study can be used to develop programs to support, preserve, and improve the mental health of students in both countries, especially Ukraine, in order to optimize the educational environment during the war and post-war period.

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ПОРІВНЯЛЬНИЙ АНАЛІЗ РІВНІВ ПСИХОФІЗІОЛОГІЧНОЇ АДАПТАЦІЇ СТУДЕНТСЬКОЇ МОЛОДІ УКРАЇНИ ТА ІСПАНІЇ

Метою статті було встановлення відмінностей рівнів психофізіологічної адаптації студентської молоді України та Іспанії в умовах навчальної діяльності. У дослідженні взяли участь 180 здобувачів вищої освіти віком 17-28 років, обох статей: 90 з Факультету медсестринства університету Вальядоліду (Кастилія і Леон, Іспанія) та 90 з Черкаського національного університету імені Богдана Хмельницького різних навчально-наукових інститутів не спортивних спеціальностей, Україна.

Для оцінки рівня психофізіологічної адаптації (ПА) було використано оригінальну комп'ютерну програму «Інтегральна оцінка психофізіологічної адаптації людини». Вона включала оцінку: реактивної (РП) та особистісної (ОО) тривожності; вестибулярної функції (ВФ); тепінг-тесту (ТТ); частоти серцевих скорочень (ЧСС); систолічного (САТ) та діастолічного (ДАТ) артеріального тиску; енергетичного балансу за даними кольоро- (КС) й звуко-сприйняття (ЗС). Статистичний аналіз отриманих результатів проводили методами параметричної статистики із застосуванням пакету програм MS Excel 2010.

Встановлено, що значна частина студентської молоді в Україні на сьогодні характеризується вираженим станом хронічного стресу та, внаслідок цього, низьким рівнем ПА. Порівняно студентської молоді Іспанії, українські здобувачі вищої освіти відрізнялися значно гіршими показниками ПА, що проявлялося у достовірно меншій кількості осіб із високим рівнем ПА та значній кількості обстежуваних із критично-низьким її рівнем. Серед іспанської студентської молоді осіб з критично низьким рівнем ПА встановлено не було. Молоді українці характеризувались порівняно вищими показниками тривожності, ЧСС, САТ і ДАТ, нижчими показниками ВФ, ТТ, КС і ЗС, що прямо корелювало з невисокими рівнями ПА на фоні воєнного стану в Україні та пов’язаними з ним негативними факторам, напруженістю, інтенсивністю і складністю навчального процесу за цих умов. Встановлено, що провідними факторами, які обумовлювали рівні ПА були: РТ, ОТ, ЧСС, ТТ і ВФ. Розроблено практичні рекомендації, які можуть бути корисними для покращення ПА студентської молоді.

***Ключові слова**: психофізіологічна адаптація, стресостійкість, тривожність, стрес, студентська молодь.*

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