



Research Article

© 2024 Kocherga et al.
This is an open access article licensed under the Creative Commons
Attribution-NonCommercial 4.0 International License
(<https://creativecommons.org/licenses/by-nc/4.0/>)

Received: 2 February 2024 / Accepted: 25 April 2024 / Published: 5 May 2024

The Influence of the Teacher's Psycho-Physiological States on the Development of Professional Competencies in the Course of the Military Aggression

Oleksandr Kocherga¹
Liudmyla Melenets²
Svitlana Savchenko³
Yurii Cherpak⁴
Viktoriiia Shcherbyna⁵
Svitlana Pazuk⁶

¹Candidate of Psychological Sciences, Associate Professor, Department of Preschool and Primary Education, Institute of In-Service Education, Borys Grinchenko Kyiv University, Kyiv, Ukraine

²Candidate of Pedagogical Sciences, Head of Department of Preschool and Primary Education, Institute of In-Service Education, Borys Grinchenko Kyiv University, Kyiv, Ukraine

³Candidate of Historical Sciences, Associate Professor of the Department of the Historical and Civic Education, Institute of In-Service Education, Borys Grinchenko Kyiv University, Kyiv, Ukraine

⁴Candidate of Pedagogical Sciences, Associate Professor of the Department of Preschool and Primary Education, Institute of In-Service Education, Borys Grinchenko University of Kyiv, Kyiv, Ukraine

⁵Candidate of Political Sciences, Associate Professor of the Department of Preschool and Primary Education, Institute of In-Service Education, Borys Grinchenko University of Kyiv, Kyiv, Ukraine

⁶Junior Research Fellow, Research Laboratory of Experimental Pedagogy and Pedagogical Innovations, Institute of In-Service Education, Borys Grinchenko Kyiv University, Kyiv, Ukraine

DOI: <https://doi.org/10.36941/jesr-2024-0055>

Abstract

The aim of the article is to determine the specifics of the impact of the correctional programme of psycho-physiological conditions on the development of the professional competence of general secondary school teachers. The Diagnostics of Mental States of the National Academy of Sciences and the Impact of Event Scale - Revised (IES-R) were used to obtain reliable data on the psycho-physiological state of the individual. A specialized online test for teachers was used to obtain data on the teachers' competence aimed at determining informational competence, testing to determine the teacher's subject methodical competence, observation of communicative competence. A formative experiment was planned and conducted. It was established that average indicators of psycho-physiological state prevail among teachers. The positive impact of the developed corrective programme on the teachers' activity and mood was proved. It was concluded that the change in the psycho-physiological states of "invasion" and "avoidance" significantly depends on current social conditions, in particular, on the stability of the safety component. It was found that the correctional programme levelled the connections between the teachers' subject methodical competence and the current psycho-physiological state. It was established that the teachers' communicative competence continues to correlate after the completion of the programme with psycho-physiological comfort and general emotional background. In general, we can talk about the relative effectiveness of the developed corrective programme. The obtained results can be used to optimize programmes of continuous postgraduate education in the context of the development of resistance to the stresses of wartime. The prospects for further research are expanding the arsenal of methods for studying the teachers' psycho-physiological state and clarifying gender differences in the teachers' experience of stress.

Keywords: professional competence, teachers, psycho-physiological conditions, stress

1. Introduction

The education sector is one of the foundations of the effective functioning of the state. In this context, an important social task is the quality training of relevant professional specialists. Effective professional development of a modern personality should take place throughout life (Nychkalo, 2015). The quality of professional improvement is determined by specific changes in the practice of pedagogical activity and the improvement of the learners' results (Darling-Hammond et al., 2017). Therefore, specialists in the field of education should regularly participate in professional development programmes (Nguyen, 2019). So, educational programmes aimed at to improve the teachers' professional competence, should be planned and implemented taking into account the specific socio-cultural conditions and psychological characteristics of the subjects. A full-scale war makes significant adjustments in all spheres of social life and, of course, the current situation should be taken into account in planning the development of professional competence.

The psycho-physiological aspect is of great importance for the professional development of person-to-person specialists (Kokun et al., 2013). At the same time, one should focus not only on psychological aspects, but also pay attention to physiological indicators in the study of psycho-physiological states (Weckesser et al., 2019). The teaching profession is associated with the danger of developing negative psycho-physiological conditions that provoke exhaustion and general deterioration of physical health (Harmsen et al., 2018). Headaches, increased tension, fatigue, as well as mental and psychosomatic illnesses are typical for teachers (Scheuch et al., 2015). Difficulties of a psycho-physiological nature reduce the quality of teaching and destabilize learners' motivation. The emotional exhaustion of teachers further affects the quality of their teaching and reduces students' performance and motivation (Klusmann et al., 2016). Building skills of controlling negative psycho-physiological states is important for the teachers' professional development (DeClercq et al., 2022).

Therefore, the problem of connection between psycho-physiological states and teachers' professional development requires study in the context of specific social conditions. The study of this issue in the field of military aggression is designed to complement the theory of professional development of teachers and to optimize the relevant programmes of correction and training for possible optimal adaptation.

The aim of the research is to determine the specifics of the influence of the programme for the correction of psycho-physiological conditions on the development of the professional competence of general secondary school teachers.

Research objectives:

1. Find out the psycho-physiological conditions for the development of teachers' professional competence;
2. Determine the specifics of the connection between the teachers' psycho-physiological states and the level of their professional competence;
3. Develop and test a programme for the correction of the psycho-physiological states of teachers in the context of building professional competence of general secondary school teachers.

2. Literature Review

The impact of psychophysiological changes in the body is ambiguous — they can activate adaptive, protective mechanisms, and can cause systemic, long-term changes in the body and psyche (McEwen & Seeman, 1999). Stress occupies a special place among the psycho-physiological states of a person. It is a state of tension that occurs when psychological and physiological resistance to adverse circumstances decreases (Cohen et al., 2016). Stress affects the state of health physiologically (through autonomic reactions and neurohumoral regulation) and psychologically (transformations of the emotional sphere) (Hill et al., 2018). Chronic stress is the main source of somatic and mental pathologies (Kampa et al., 2020). The effect of chronic stress on the cardiovascular system is

especially noticeable, and specifically, on the increased likelihood of heart attacks and hypertension (Chatkoff et al., 2010). The impact of psycho-physiological states of a negative background on the decreased efficiency of the nervous system is also confirmed (Eddy et al., 2016).

The main sources of negative psycho-physiological states of teachers are excessive workload, lack of professional support, total control of the professional process by management, conflicts with students and parents, poor working conditions, low financial support (von Haaren-Mack et al., 2020). The teachers' reaction to stressful events depends both on the characteristics of the subject and on the social environment, which form an individual psycho-physiological reaction (Holmgreen et al., 2017). When teachers have fewer individual opportunities to overcome stress, they are oriented towards finding support in the environment of the educational institution (Hsieh et al., 2021). The psycho-physiological states of teachers can vary significantly depending on working and weekend days (Wettstein et al., 2020). The Covid-19 pandemic had a significant impact on the deterioration of the psychological and physiological components of teachers' well-being (Pressley, 2021). Distress causes the development of the syndrome of professional burnout, which reduces the quality of teaching, the teachers' general working capacity, and communicative competence (Arbia et al., 2023).

In the context of the war in Ukraine, the psychological conditions that ensure the teacher's psycho-physiological stability should be determined:

- Restoration of a sense of security through understanding the specifics of living in life-threatening situations;
- Safe and ecological response to emotional problems arising from military actions;
- Ecology of educational communication, taking into account the peculiarities of psycho-physiological systems of the brain in the face of external threats;
- Creation of a safe educational environment based on common values;
- Reliance on the psychological and physiological comfort of teachers (Tsiuman et al., 2022).

Longitudinal and experimental plans should be used to clarify the data on the impact of acute and chronic negative psycho-physiological conditions on the teacher's body and psyche, which allow a systematic approach to the study of the specified problem (McGee et al., 2020). Researchers emphasize that the state policy in the field of education should be based on the formation of an appropriate professional climate and consistent work to overcome the teachers' negative psycho-physiological states, first of all, professional burnout and stress (Schaack et al., 2020). A positive assessment of one's own competence has a significant impact on the regulation of teachers' stress (Jōgi et al., 2023). In this context, it is also worth paying attention to the need to provide qualified medical care aimed at effective treatment of stress-related diseases (Varol et al., 2021). Within the scope of our study, it is important to remember that stimulating the teachers' professional development affects the reduction of stress (Sandilos et al., 2018). At the current stage of education development, stress management programmes are not sufficiently integrated into the programmes of continuous professional development of teachers (Hartney, 2020).

Studying the relationship between psycho-physiological states and the teachers' professional competencies during wartime will help to supplement the existing theory and optimize professional development programmes.

3. Methods and Materials

The research objectives were fulfilled during the basic stages of the research, which correspond to the methodology of psychological and pedagogical sciences. The objectivity of the research is substantiated by a thorough theoretical analysis of the problem.

The research planning stage involves determining material, human, and time resources, as well as the research operations algorithm. The deontological foundations of this research are determined. The structural components of the professional competence of teachers (Order of the Ministry of Economic Development, Trade and Agriculture of Ukraine No. 2736, 2020) were identified based on the content of the professional standard of a primary school teacher, a general secondary school

teacher, a pre-school teacher (with a junior specialist diploma). Having analysed the identified competencies to optimize the research, it was decided to choose subject methodical, communicative, and informational digital competence for the study. The methods of collecting empirical information are determined and the programme for the correction of the psycho-physiological state in view of a traumatic experience is specified. The general orientations of the future correctional programme were designed. The analysis of theoretical literature gave grounds for advancing the research hypotheses:

- Teachers' psycho-physiological states and level of their professional competencies are interrelated;
- The programme for the correction of psycho-physiological conditions has a positive effect on the change in indicators of the development of teachers' professional competencies.

An experimental plan was developed and research samples were formed. At this stage, there was an active interaction with the directors of schools and local education departments regarding the establishment and coordination of research efforts.

The primary diagnostic test is the application of research methods online and offline, depending on specific security conditions.

The formative stage is the implementation of the developed programme for the correction of psycho-physiological conditions of general secondary school teachers.

Re-diagnostic section of conducting diagnostic methods to find out the dynamics of the psycho-physiological states of the studied teachers.

The stage of quantitative and qualitative data processing is aimed at recording the general trends of connection between psycho-physiological states and indicators of teachers' professional competences, expressed in numerical form.

Instruments. Related tests were used to diagnose the specifics of the teachers' psycho-physiological states. The Well-Being, Activity, Mood Questionnaire (WAM) is used in assessing the mental state of sick and healthy people, determining the psycho-emotional reaction to stress, and helps to identify individual features of psycho-physiological functions. The methodology is based on the Likert scale and consists of thirty items to be evaluated by the respondent. The Impact of Event Scale - Revised (IES-R) is a clinical test method aimed at identifying changes in psycho-physiological parameters under the influence of stress. It consists of 22 items characterizing behavioural reactions, which respondents have to rate on a 5-point scale. The scale assesses the impact of a traumatic event (IES-R). The validity of the tools is substantiated by their justifications in earlier studies (Zlyvkov, 2016).

A specialized online test for teachers (<https://osvita.diiia.gov.ua/digigram>) was used to study information and digital competence. A positive aspect of the used tool is the consideration of socio-cultural and professional realities.

Testing to determine the teacher's subject methodical competence. Test questions are created on the basis of information about the content of the relevant academic subject and teaching methods at school.

Observation of communicative competence was carried out based on the criteria of the subject-subject model of pedagogical communication. The method involves focusing on the professional specifics of communication, and not simply recording the level of communicative competence. Observation is implemented in online and offline format.

The formative experiment was based on the implementation of the programme for the correction of psycho-physiological states as an independent variable. Psycho-physiological states manifested in the emotional sphere and methods of reaction to the realities of wartime are a dependent variable. The class was conducted offline. A total of 12 classes of 45-60 minutes each were delivered. Classes were held once a week during February-May 2023. The main orientations of the developed programme: development of methods of self-control of negative psycho-physiological states, rethinking of traumatic experiences, development of resistance to stressful situations. The main content of the corrective programme consists of games and relaxation exercises. Psychologists

and teachers acted as experimenters and programme managers.

The sample was formed from general secondary school teachers in Kyiv, Khmelnytskyi, Vinnytsia, and Poltava. A mandatory condition was the teachers' stay on the territory of Ukraine. An experimental group of 124 people and a control group of 115 people were formed. Primary school teachers, history and physical culture teachers are included in the research groups, which corresponds to the aim of the study. Only women participated in the study. The respondents had an experience 2 to 25 years. There is the largest proportion of teachers with 5-15 years of experience in the samples.

Data collection involved the implementation of primary and secondary diagnostics online. The implementation of diagnostic methods was based on detailed instructions to the subjects, establishing optimal feedback, forming the motivation of research participants to work. It should be noted that the diagnostics was carried out in November-December 2022, which was the time of mass missile attacks on the territory of Ukraine. It was possible to directly record the connection of physiological states with the intensification of hostilities. Primary and secondary diagnostics were performed by different researchers. This approach made it possible to neutralize the possible influence of the Pygmalion effect. It should be noted that only methods involving psychological measurement were used in the study. At the same time, the use of psychophysiological tools would increase the reliability of the obtained data. Note that the use of psychological tests is justified based on a theoretical analysis of the problem. Also, the reliability of the research results would be increased due to the use of randomization. The approach to the formation of samples was conditioned by the method and specificity of the forming experiment.

The data analysis involved the use of percentage analysis, Spearman's rank correlation coefficient, and Student's t-test. SPSS was used for data processing.

Ethical criteria were ensured by the consent to participate in the study. The used research methods did not degrade the dignity of the participants, which was confirmed by the analysis of independent experts.

4. Results

Table 1 presents the results of the formative experiment aimed at the correction of psycho-physiological states.

Table 1: Dynamics of indicators of the teachers' psycho-physiological states before and after the implementation of the corrective programme

Criteria of psycho-physiological state	Levels of development	The number of respondents							
		Control group (CG)				Experimental group (EG)			
		Before		After		Before		After	
		Q-ty	%	Q-ty	%	Q-ty	%	Q-ty	%
Well-being	Low	40	34.78	5	4.35	41	33.06	5	4.03
	Medium	67	58.26	101	87.82	69	55.65	73	58.87
	High	8	6.96	9	7.83	14	11.29	46	37.1
Activity	Low	29	25.22	27	23.48	31	25	0	0
	Medium	82	71.3	84	73.04	88	70.97	98	79.04
	High	4	3.48	4	3.48	5	4.03	26	20.96
Mood	Low	4	3.48	4	3.48	3	2.42	3	2.42
	Medium	111	96.52	110	95.65	119	95.97	89	71.77
	High	0	0	1	0.87	2	1.61	32	25.81
Intrusion	Low	13	11.3	15	13.04	12	9.68	7	5.65
	Medium	54	46.96	72	62.61	60	48.39	102	82.26
	High	48	41.74	28	24.35	52	41.93	15	12.09
Avoidance	Low	12	10.43	2	1.74	13	10.48	2	1.61
	Medium	90	78.27	112	97.39	98	79.04	122	98.39
	High	13	11.3	1	0.87	13	10.48	0	0

Criteria of psycho-physiological state	Levels of development	The number of respondents							
		Control group (CG)				Experimental group (EG)			
		Before		After		Before		After	
		Q-ty	%	Q-ty	%	Q-ty	%	Q-ty	%
Excitability	Low	5	4.35	6	5.22	5	4.03	5	4.03
	Medium	83	72.17	82	71.3	90	72.58	90	72.58
	High	27	23.48	27	23.48	29	23.39	29	23.39

The Well-being criterion, which was determined using the WAM questionnaire, reflects the experience of the comfort level of the psycho-physiological state. Primary diagnostics showed that medium indicators are mostly characteristic of psychophysiological comfort for teachers. The number of subjects with low indicators of this condition is minimal (6.96% in CG and 11.29% in the EG). The changes in the psycho-physiological component were recorded in both groups after the implementation of the programme. In CG, the number of teachers with medium indicators increased by 29.56%, and the number of subjects with a low level of well-being decreased by 30.43%. The changes were also found in EG, but according to the growing number of teachers with high indicators of the condition (by 25.81%). At the same time, trends in the medium level of well-being in the experimental sample have almost not changed.

The Activity criterion, which was determined using the WAM questionnaire, reflects the psycho-physiological characteristics of energy that is realized in certain actions. More than 70% of the studied teachers are characterized by a medium level of activity. About a quarter of the studied teachers demonstrate low indicators of this psycho-physiological parameter. Only a few people have been diagnosed with a high level. Changes in the component were recorded in EG — the number of subjects with a high level increased by 16.93%. At the same time, teachers with a low level of activity were not found at all after the implementation of the corrective programme. The number of teachers with a medium level of the studied condition increased by approximately 9%.

The Mood criterion, diagnosed using the WAM questionnaire, characterizes the general psycho-physiological tone, which reflects the emotional and biological indicators of the body. In both groups, there is a total dominance of the medium indicators of this psycho-physiological state (more than 95% of respondents). No significant changes in the parameter were recorded in CG after the correction programme. In EG, high Mood indicators increased by 24.2%. Accordingly, the number of persons with medium indicators decreased by the corresponding percentage.

The Intrusion parameter, which was determined using the Impact of Event Scale - Revised (IES-R), characterizes the significant impact of military actions on psycho-physiological indicators. In particular, traumatic scenes in dreams and the intensity of obsessive thoughts in the mind are diagnosed. Diagnostic tests recorded an approximately even distribution of persons with medium and high indicators of this psycho-physiological condition among teachers. A shift in the trends of this condition was found in both samples. In the CG, the number of people with high indicators decreased by 17.39%, and the number of people with medium indicators of the parameter increased by 15.65%. Similar trends are recorded in EG, but the dynamics of changes are more significant: the number of subjects with high indicators decreased by 29.84%, and the medium level increased by 33.87%.

The Avoidance parameter, which was determined using the Impact of Event Scale - Revised (IES-R), is psychologically characterized by the activation of displacement mechanisms, and psychologically by the predominance of inhibition in the nervous system. Before the implementation of the programme in the studied groups, medium indicators at the level of 80% dominated. After the implementation of the corrective programme, an increased number of people with medium indicators was recorded: in CG by 19.12%, in EG by 19.35%. The obtained results may indirectly indicate that the reason for the changes in the Avoidance parameter are not the correction programme, but a change in the circumstances associated with a decreased intensity of shelling.

The Excitability parameter, which was determined using a scale for assessing the impact of a

traumatic event, is psychologically characterized by an increased aggressiveness, and physiologically – by the dominance of excitation processes in the nervous system. The medium level of this psycho-physiological condition dominate among the studied teachers. Approximately 23% of the subjects recorded high indicators. There were no significant changes in both samples of teachers after the completion of the correctional programme, which is confirmed by the results of calculating the Student’s t-test ($t=1.076$; $t=1.318$).

Conclusions about the effectiveness of the correctional programme are based on the calculation of Student’s t-test (Table 2). Well-being indicators change in both samples ($t=2.232$; $t=3.529$). In CG, the difference in psycho-physiological comfort indicators is recorded at 0.05, while in EG — at 0.01. Student’s t-test in CG for the Activity criterion: $t=1.829$ (no significant changes), and in the experimental sample: $t=2.814$ (changes of 0.01). The effectiveness of the correctional programme for the Mood parameter is confirmed at the significance level of 0.01 ($t=3.651$). There are no statistically significant shifts in CG ($t=3.342$).

Table 2: The Student’s t-test of indicators of psycho-physiological conditions after the implementation of the correction programme

Criteria of psycho-physiological state	Student’s t-test	
	Control group	Experimental group
Well-being	2.232*	3.529**
Activity	1.829	2.814**
Mood	1.342	3.651**
Intrusion	2.332*	2.713**
Avoidance	2.453*	2.595*
Excitability	1.076	1.318

The results of the percentage analysis of the Invasion parameter are confirmed: in CG, the coefficient of significance of differences was found at 0.05 ($t=2.332$), and in EG — at 0.01 ($t=2.713$). In both samples, the Avoidance parameter recorded statistical coefficients at the significance level of 0.05 ($t=2.453$; $t=2.595$). After the completion of the correctional programme, there were no significant changes in both samples of teachers, which is confirmed by the results of the Student’s t-test ($t=1.076$; $t=1.318$).

Spearman’s correlation coefficients were calculated to identify structural and functional relationships between indicators of the teachers’ psycho-physiological state and professional competencies, as the data are presented in an ordinal scale (Table 3, Table 4).

Table 3: Correlation matrix of indicators of the psycho-physiological state of teachers with professional competencies of the CG teachers

Criteria of psycho-physiological state	Teachers’ professional competencies					
	Control group (before the programme implementation)			Control group (after the programme implementation)		
	SMC	CC	IDC	SMC	CC	IDC
Well-being	0.201*	0.239**	0.078	0.213*	0.246**	0.078
Activity	0.054	0.166	0.056	0.094	0.144	0.034
Mood	0.286**	0.401**	0.121	0.277**	0.381**	0.122
Intrusion	-0.263**	-0.235**	0.135	-0.246**	-0.248**	-0.156
Avoidance	0.043	0.153	-0.158	0.023	0.111	0.123
Excitability	0.098	-0.396**	0.144	0.009	-0.402**	0.011

Table 4: Correlation matrix of indicators of the psycho-physiological state of teachers with professional competencies of the EG teachers

Criteria of psycho-physiological state	Teachers' professional competencies					
	Control group (before the programme implementation)			Control group (after the programme implementation)		
	SMC	CC	IDC	SMC	CC	IDC
Well-being	0.188*	0.255**	0.084	0.109	0.260**	0.162
Activity	0.054	0.121	0.022	0.129	0.021	0.049
Mood	0.297**	0.422**	0.134	0.152	0.280**	0.102
Intrusion	-0.297**	-0.264**	0.142	-0.033	-0.092	-0.133
Avoidance	0.112	0.110	-0.149	0.065	0.071	0.098
Excitability	0.135	-0.361**	0.103	-0.003	-0.144	0.066

Conventional designations of tables: SMC – subject methodical competence; CC – communicative competence; IDC – information and digital competence. It was found that indicators of information and digital competence have no significant relationship with psycho-physiological states in the studied groups. In the control and experimental groups, significant correlations of subject methodical competence with well-being, mood, and state of invasion are observed. Significant relationships of communicative competence with well-being, mood, as well as an inverse correlation with intrusion and excitability were also found. After the completion of the formative experiment, the correlation indicators in the control group of teachers did not change. In the experimental group, the relationships between psychophysiological states and subject methodical competence are no longer recorded after the completion of the formative experiment. The relationships of communicative competence with the states of intrusion and excitability also disappear. However, significant relationships with well-being and mood remain.

The results of the study partially confirm the research hypotheses.

5. Discussion

It is appropriate to interpret the obtained results in the context of current socio-cultural conditions – the military aggression of the Russian Federation, as the teachers' reaction to stressful events depends on social conditions (Holmgreen et al., 2017). The teachers' psychological comfort was affected not only by the correctional programme, but also by the change in the security situation in Ukraine. The positive formative influence of the developed programme on the teachers' activity and mood can be stated. The change in the psycho-physiological states of intrusion and avoidance in both groups casts doubt on the effectiveness of the training programme regarding these components. The state of excitability remained unchanged, which indicates its deep connection with current social events. The correctional programme made it possible to level the connections between the teachers' subject methodical competence and their current psycho-physiological state. At the same time, the teachers' communicative competence continues to correlate after the completion of the programme with psycho-physiological comfort and general emotional background. Therefore, the researchers' conclusions about the impact of stress on the teacher's pedagogical communication skills are confirmed (Arbia et al., 2023). Such trends are explained by the positive impact of the exercises on the stabilization of the psycho-emotional sphere in the context of the perception of wartime. We confirm the role of teachers' self-confidence in managing stress (Jōgi et al., 2023).

In general, we can assume the formation of teachers' resilience in the course of the military aggression as a result of formative influence. In this context, the development of teachers' self-control is relevant (DeClercq et al., 2022). The effectiveness of psycho-physiological correction determines the improvement of teachers' health indicators and the levelling of exhaustion (Harmsen et al., 2018). The study of chronic stress as a factor in cardiovascular diseases of teachers is of interest (Chatkoff et

al., 2010; Tomchuk et al., 2020). It is also appropriate to consider the possibility of varying the corrective impact depending on whether working days and weekends are taken into account (Wettstein et al., 2020). We agree with the opinion about the lack of consistent building of stress coping skills in the context of teachers' professional development (Hartney, 2020).

The results of the study should be communicated to the administration of the educational institution in order to create a favourable environment for overcoming stress (Hsieh et al., 2021). The correctional programme can be improved by taking into account the conditions for ensuring the teacher's psycho-physiological stability in wartime (Tsiuman et al., 2022).

6. Limitations

In our opinion, the results of the formative experiment could depend not only on the impact of the correction programme, but also on the dynamics of the security situation on the territory of Ukraine, and specifically on the reduction in the number of missile attacks in the spring of 2023. In this regard, repeated formative experiment can be conducted in order to clarify the obtained data. It is also advisable to expand the research sample by pre-school and out-of-school teachers in order to achieve representativeness of the results.

7. Conclusions

The main psychological conditions for stabilizing the teachers' psycho-physiological state in wartime are restoring a sense of security, safe and ecological response to emotional problems, taking into account the peculiarities of the functioning of the brain in the context of military operations, creating a safe educational environment, and forming the psychological comfort of teachers. It was established that medium indicators of psycho-physiological state prevail among teachers. The positive impact of the developed correction program on the teachers' activity and mood was proved. The change in the psychophysiological states of invasion and avoidance significantly depends on current social conditions, in particular, on the stability of the safety component. It was found that the correctional programme made it possible to level the relationships between the teachers' subject methodical competence and the current psycho-physiological state. At the same time, the teachers' communicative competence continues to correlate after the completion of the programme with psycho-physiological comfort and general emotional background. In general, we can talk about the relative effectiveness of the developed correctional programme. The obtained results can be used to optimize programmes of continuous, postgraduate education of pre-school, primary school, and general secondary school teachers in the context of the development of resistance to the stresses of wartime. The prospects for further research in this area is expanding the range of methods for studying the teachers' psycho-physiological state in general secondary education institutions, preschool education institutions, out-of-school education institutions, in particular, practical psychologists, social pedagogues, and identifying gender differences in the stress experienced by specialists in the field of education.

References

- Arbia, G., Carbone, A., Stanzione, I., & Szpunar, G. (2023). The Work-Related Stress and Well-Being of Teachers – An Exploratory Study within Primary Schools in Italy. *Education Sciences*, 13(5), 505. <https://doi.org/10.3390/educsci13050505>
- Chatkoff, D. K., Maier, K. J., & Klein, C. (2010). Nonlinear associations between chronic stress and cardiovascular reactivity and recovery. *International Journal of Psychophysiology*, 77(2): 150-156. <https://doi.org/10.1016/j.ijpsycho.2010.05.008>
- Cohen, S., Gianaros, P., & Manuck, S. (2016). A stage model of stress and disease. *Perspectives on Psychological Science*, 11(4): 456-463. <https://doi.org/10.1177/174569161664630>

- Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). *Effective Teacher Professional Development*. Palo Alto: Learning Policy Institute. https://learningpolicyinstitute.org/sites/default/files/product-files/Effective_Teacher_Professional_Development_BRIEF.pdf
- DeClercq, M., Watt, H. M. G., & Richardson, P. W. (2022). Profiles of Teachers' Striving and Wellbeing: Evolution and Relations with Context Factors, Retention, and Professional Engagement. *Journal of Educational Psychology, 114*(3), 637–655. <https://doi.org/10.1037/edu0000702>
- Eddy, P., Heckenberg, R., Wertheim, E. H., Kent, S., & Wright, B. J. (2016). A systematic review and meta-analysis of the effort-reward imbalance model of workplace stress with indicators of immune function. *Journal of Psychosomatic Research, 91*, 1–8. <https://doi.org/10.1016/j.jpsychores.2016.10.003>
- Harmsen, R., Helms-Lorenz, M., Maulana, R., & van Veen, K. (2018). The relationship between beginning teachers' stress causes, stress responses, teaching behaviour and attrition. *Teachers and Teaching, 24*(6), 626–643. <https://doi.org/10.1080/13540602.2018.1465404>
- Hartney, E. (2020). Stress Management to Enhance Teaching Quality and Teaching Effectiveness: A Professional Development Framework for Teachers. In: *Occupational Stress: Breakthroughs in Research and Practice* (pp. 306–331). IGI Global. <https://doi.org/10.4018/978-1-7998-0954-8.ch014>
- Hill, D. C., Moss, R. H., Sykes-Muskett, B., Conner, M., & O'Connor, D. B. (2018). Stress and eating behaviors in children and adolescents: Systematic review and meta-analysis. *Appetite, 123*, 14–22. <https://doi.org/10.1016/j.appet.2017.11.109>
- Holmgren, L., Tirone, V., Gerhart, J., & Hobfoll, S. E. (2017). Conservation of Resources Theory. In: C. L. Cooper & J. Campbell Quick (Eds.), *The Handbook of Stress and Health: A Guide to Research and Practice*, First Edition (pp. 443–457). John Wiley & Sons Ltd. <https://doi.org/10.1002/9781118993811.ch27>
- Hsieh, C.-C., Ho, S. S.-H., Li, H.-C., & Liang, J.-K. (2021). Mindfulness as Moderator Against Emotional Exhaustion Due to Online Teaching During COVID-19 Pandemic: An Investigation Using Job Demands-Resources Model and Conservation of Resource Theory. *Frontiers in Psychology, 12*, 781804. <https://doi.org/10.3389/fpsyg.2021.781804>
- Jögi, A. L., Aulén, A. M., Pakarinen, E., & Lerkkanen, M. K. (2023). Teachers' daily physiological stress and positive affect in relation to their general occupational well-being. *British Journal of Educational Psychology, 93*(1), 368–385. <https://doi.org/10.1111/bjep.12561>
- Kampa, M., Finke, J., Stalder, T., Bucher, L., Klapperich, H., Mertl, F., ... Klucken, T. (2020). Facilitating relaxation and stress reduction in healthy participants through a virtual reality intervention: study protocol for a non-inferiority randomized controlled trial. *Trials, 23*, 380. <https://doi.org/10.1186/s13063-022-06307-8>
- Klusmann, U., Richter, D., & Lüdtke, O. (2016). Teachers' emotional exhaustion is negatively related to students' achievement: Evidence from a large-scale assessment study. *Journal of Educational Psychology, 108*(8), 1193–1203. <https://doi.org/10.1037/edu0000125>
- Kokun, O. M. (2013). Psychophysiological support for becoming a specialist in “person-to-person” professions. Kirovohrad: Imeks-LTD. <https://core.ac.uk/download/pdf/19596285.pdf>
- McEwen, B. S., & Seaman, T. (1999). Protective and damaging effects of mediators of stress: elaborating and testing the concepts of allostasis and allostatic load. *Annals of the New York Academy of Sciences, 896*(1), 30–47. <https://doi.org/10.1111/j.1749-6632.1999.tb08103.x>
- McGee, A. B., Scott, S. R., Manczak, E. M. & Watamura, S. E. (2023). Associations between the Psychophysiological Impacts of Teacher Occupational Stress and Stress Biomarkers: A Systematic Review. *Psychoneuroimmunology Journal, 4*, art246145. <https://doi.org/10.32371/pnij/246145>
- Nguyen, H. C. (2019). An investigation of professional development among educational policy-makers, institutional leaders and teachers. *Management in Education, 33*(1), 32–36. <https://doi.org/10.1177/0892020618781678>
- Nychkalo, N. (2015). Professional development of the individual in the context of continuity. In: V. H. Kremenia, M. F. Dmytrychenka & N. H. Nychkalo (Eds.), *Conceptual principles of professional development of the individual in the conditions of European integration processes*. Kyiv: NTU. <https://core.ac.uk/download/pdf/32310623.pdf>
- Order of the Ministry of Economic Development, Trade and Agriculture of Ukraine from 23.12.2020 No. 2736. *On the approval of the professional standard for the professions "Teacher of primary classes of a general secondary education institution", "Teacher of a general secondary education institution", "Teacher of primary education (with junior specialist diploma)".* <https://nus.org.ua/news/zatverdyl-try-profesijni-standart-vchytelya-dokument/>
- Pressley, T. (2021). Elementary hybrid and virtual teacher stress during COVID-19. *Journal of Research in Education, 30*(3), 97–116. <https://eric.ed.gov/?id=EJ1325479>

- Sandilos, L. E., Goble, P., Rimm-Kaufman, P., & Pianta, R. C. (2018). Does professional development reduce the influence of teacher stress on teacher–child interactions in pre-kindergarten classrooms? *Early Childhood Research Quarterly*, 42, 280–290. <https://doi.org/10.1016/j.ecresq.2017.10.009>.
- Schaack, D. D., Le, V.-N., & Stedron, J. (2020). When fulfillment is not enough: early childhood teacher occupational burnout and turnover intentions from a job demands and resources perspective. *Early Education and Development*, 31, 1011–1030. <https://eric.ed.gov/?id=EJ1268204>
- Scheuch, K., Haufe, E., & Seibt, R. (2015). Teachers' health. *Deutsches Ärzteblatt International*, 112, 347–356. <https://doi.org/10.3238/arztebl.2015.0347>
- Tomchuk, O., Tserklevych, V., Hurman, O., Petrenko, V., & Chymosh, K. (2020). The efficiency of higher education institutions: Evaluation and management of managers. *Estudios de Economia Aplicada*, 38(4).
- Tsiuman, T., Nahyla, O., & Adamska, Z. (2022). Psychological conditions of teacher resilience during the period of military situation. *Pedagogical Education: Theory and Practice. Psychology. Pedagogy*, 38(2), 83–89. <https://doi.org/10.28925/2311-2409.2022.3813>
- Varol, Y. Z., Weiher, G. M., Wendsche, J., & Lohmann-Haislah, A. (2021). Difficulties detaching psychologically from work among German teachers: prevalence, risk factors and health outcomes within a cross-sectional and national representative employee survey. *BMC Public Health*, 21, 2046. <https://doi.org/10.1186/s12889-021-12118-4>.
- von Haaren-Mack, B., Schaefer, A., Pels, F., & Kleinert, J. (2020). Stress in physical education teachers: a systematic review of sources, consequences, and moderators of stress. *Research Quarterly for Exercise and Sport*, 91, 279–297. <https://doi.org/10.1080/02701367.2019.1662878>
- Weckesser, L. J., Dietz, F., Schmidt, K., Grass, J., Kirschbaum, C., & Miller, R. (2019). The psychometric properties and temporal dynamics of subjective stress, retrospectively assessed by different informants and questionnaires, and hair cortisol concentrations. *Scientific Reports*, 9, 1098. <https://doi.org/10.1038/s41598-018-37526-2>
- Wettstein, A, Kühne, F, Tschacher, W, & La Marca, R. (2020). Ambulatory Assessment of Psychological and Physiological Stress on Workdays and Free Days Among Teachers. A Preliminary Study. *A Preliminary Study. Front Neurosci*, 14, 112. <https://doi.org/10.3389/fnins.2020.00112>.
- Zlyvkov, V. L., Lukomska, S. O., & Fedan, O. V. (2016). *Psychodiagnostics of personality in life crisis situations*. Kyiv: Pedahohichna dumka. <https://core.ac.uk/download/pdf/77241343.pdf>