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A Neuropsychological Approach to Stress Resilience in Primary School Teachers under Educational Risks

Nataliia Naumenko

Doctor of Pedagogical Sciences, Professor of the Department of Corrective Pedagogy and Human Health, H. S. Skovoroda Kharkiv National Pedagogical University, Kharkiv, Ukraine.
naumenkonv.77@gmail.com,
<https://orcid.org/0000-0003-0658-1769>

Olha Riaboshapka

Candidate of Pedagogical Sciences, Associate Professor, Associate Professor of the Department of Psychology and Pedagogy of Child Development, Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine. lifeisgood81@ukr.net,
<https://orcid.org/0000-0002-6328-6304>

Liudmyla Starikova

Ph.D. of Science in Pedagogy, Associate Professor of the Department of Theory and Methods of Teaching Natural-Mathematical Disciplines in Preschool, Primary and Special Education, H. S. Skovoroda Kharkiv National Pedagogical University, Kharkiv, Ukraine. luda.p.starik@gmail.com,
<https://orcid.org/0000-0001-5664-4620>

Iryna Radchenia

Ph.D. of Science in Pedagogy, Associate Professor of the Department of Theory and Methods of Teaching Natural-Mathematical Disciplines in Preschool, Primary and Special Education, H. S. Skovoroda Kharkiv National Pedagogical University, Kharkiv, Ukraine. ira.radchenya@gmail.com,
<https://orcid.org/0000-0003-2524-7109>

Larysa Kondratska

Candidate of Psychological Sciences, Associate Professor, Associate Professor of the Department of Pedagogy, Psychology, Primary Education and Educational Management, Municipal Establishment «Kharkiv Humanitarian-Pedagogical Academy» of the Kharkiv Regional Council, Kharkiv, Ukraine.
lariskavk@ukr.net, <https://orcid.org/0000-0001-8353-6318>

Olena Shcherbakova

Doctor of Psychological Sciences, Professor, Leading Researcher State Institution "Institute for Children and Adolescents Health Care at the National Academy of Medical Sciences of Ukraine", Kharkiv, Ukraine.
lenascherbakova84@gmail.com, <https://orcid.org/0000-0002-9169-5471>

Abstract: Educational realities are shaped by digitalisation, ongoing reforms, the consequences of the pandemic, and various socio-economic risks. Together, these factors place significant psychological strain on primary school teachers. Their professional work requires not only pedagogical competence but also a high level of emotional resilience to cope effectively with stressful situations. A neuropsychological perspective offers valuable insights into this issue. It helps to explain how physical activity and instructional strategies can support teachers' cognitive health and maintain emotional balance. This article examines the development of stress resilience in primary school teachers working under conditions of educational risk. For many educators, a decline in stress resilience is a predictable outcome of teaching practice. This decline reflects the sustained psycho-emotional and intellectual demands of the profession. The article is theoretical in nature and defines the concept of stress resilience. It further identifies the pedagogical conditions required for its development in the professional activity of primary school teachers. It also outlines the neuropsychological mechanisms that underpin their stress resilience. Finally, the article explores the role of physical education as an effective means of enhancing stress resilience among primary school teachers in risk-related contexts. Practical recommendations are provided to cultivate this particular quality.

Keywords: psychological stress; neuropsychological approach; stress resilience; teachers; pedagogical conditions; stress-inducing factors.

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1. Introduction

One of the most pressing challenges in pedagogy today is the stress resilience of primary school teachers. This issue is particularly significant under conditions of educational risk and arises from a combination of factors. These include the increasing pace of teachers' professional lives and rapid scientific and technological progress. Such progress is reflected in the technologisation, computerisation, and digitalisation of almost all areas of human activity.

Additional pressure comes from the continuous reform of the national education system at all levels. Social stratification among pupils and the gradual cultural decline of society further complicate the situation. These processes have contributed to a growing number of children and adolescents prone to deviant behaviour. The consequences of these changes affect nearly all teachers.

Researchers and practitioners across philosophy, psychology, pedagogy, and sociology are working to develop both theoretical and practical solutions to this problem. Each field examines the issue from its own perspective, focusing on specific aspects of stress resilience.

In pedagogy, a science concerned with personality formation, stress resilience is viewed as a life-preserving quality. It strengthens across different stages of life. For primary school teachers working under educational risks, preventing professional burnout requires the ability to draw on internal resources. Teachers need to cope with stress factors that arise in various situations within both their professional and personal environments.

This theoretical article has several goals. It aims to identify the educational risks and challenges of primary school teachers' professional activity. It also examines the concept of stress resilience and the pedagogical conditions necessary for its development under educational risk. In addition, the article analyses the influence of physical exercise on stress resilience. It outlines the key neuropsychological mechanisms that support it and proposes a methodology for its formation.

Notably, the article relies on a comprehensive methodological approach. It implies a thorough theoretical analysis of sources on physical activity, neuropsychology, and pedagogy. This approach allows systematising existing perspectives and synthesising the obtained results. Finally, it supports the integration of neuropsychological patterns into practical teaching.

The article's structure follows the logical development of the research problem. The first section provides a theoretical analysis of stress resilience in primary school teaching and identifies the main educational risks that increase psycho-emotional strain. The second section examines the neuropsychological mechanisms of stress and stress resilience, focusing on the role of brain regulatory systems in maintaining teachers' psychological balance. The third section analyses physical activity as a resource for developing stress resilience from a neuropsychological perspective. The concluding section summarises the theoretical analysis and presents practical recommendations for strengthening teachers' stress resilience under conditions of educational risk.

2. The Concept of Stress Resistance in Professional Activities of Primary School Teachers

A detailed analysis of scientific definitions shows that no unified approach yet exists in psychology or science to explain stress resistance. This is despite the considerable interest it has attracted. Consequently, there is no universally accepted definition of the concept.

The term "stress resistance", as noted by Bohdanov et al. (2017), is often used to describe human states associated with different aspects of psychological stability. These include "emotional resilience", "psychological stress tolerance", "stress resistance", and "frustration tolerance". As a personality trait, stress resistance manifests in emotionally challenging situations. It ensures a harmonious balance among all components of mental activity.

Day and Gu (2010) consider stress resistance a personality trait. They explain it through the observed correlation between the presence of this quality in an individual and their high performance under extreme conditions. Similarly, Jennings and Greenberg (2009) define emotional

resilience as an emotionally balanced state of the individual in response to environmental conditions.

James et al. (2023) view stress resistance as a physiological process. In this regard, it is a feature of the nervous system related to temperament. According to Jennings and Greenberg (2009), stress resistance is understood as an integrative quality of primary school teachers working under educational risks. It reflects the interaction of multiple mental processes (emotional, volitional, intellectual, and motivational). This interaction enables teachers to achieve their goals effectively, even in complex situations that trigger heightened emotional responses.

Klassen and Chiu (2010) offer a similar interpretation. They describe stress resistance as a multi-component quality of primary school teachers. It develops during personality formation under the influence of both internal and external factors. It has a psychophysiological basis, determined by the type and properties of an individual's nervous system.

Fabrizio et al. (2025) claim that emotional resilience can be consciously enhanced or reduced. It follows that stress resistance largely depends on one's motivation. In particular, stress resistance develops through accumulated emotional experience gained from overcoming challenging situations. This process requires self-regulation. Therefore, individuals must deliberately control their actions and behaviour to respond effectively.

Professional preparedness is another crucial factor in stress resistance. It is reflected in one's readiness to address a variety of professional and work-related tasks. The intellectual component enables a person to assess stress-inducing situations accurately, anticipate possible developments, and make informed decisions about appropriate actions.

A review of various concepts related to stress resistance in the works of Skaalvik and Skaalvik (2017) allows for the definition of "stress resistance in primary school teachers under educational risks". According to Day and Gu (2010), stress resistance can be understood as a systemic personal quality of the teacher. It is characterised by cognitive abilities that enable teachers to preserve psychological and physiological stability under environmental influences. At the same time, it ensures an adequate level of professional performance.

Stress resistance in primary school teachers can be conceptualised as an interconnected unity of three structural components: motivational-evaluative, activity-based, and reflexive. These components are closely linked to the specific nature of professional pedagogical activity in teachers working under educational risks. A central foundation of stress resistance lies in interpersonal interactions with pupils and other participants in the educational process.

The motivational evaluative component is indicated by a teacher's readiness to address a wide range of pedagogical tasks. It includes the ability to set goals independently, clearly understand them, and plan effective paths for their achievement. It also involves the prevention and management of heightened negative pressures through the use of health-preserving techniques. Teachers must be able to process and apply large volumes of information, including subject-specific, pedagogical, methodological, and psychological information relevant to their professional activity. This also implies applying effective behavioural strategies in different interpersonal situations. Additionally, teachers must monitor their psycho-emotional state, assess its stability, and anticipate potential negative changes.

The level of stress resistance in primary school teachers under educational risks is characterised by low personal and situational anxiety. It is also reflected in satisfaction with both the process and outcomes of professional activity. To achieve stress resistance, Day and Gu (2014) suggest fostering this personal quality within the learning environment.

Stress resistance has two fundamental bases. The first is physiological, in the form of natural adaptability, manifested through homeostasis and the stability of the internal environment. The second is social, acquired through cultural development, which allows individuals to consciously and purposefully regulate their behaviour (Skaalvik & Skaalvik, 2017). Stress resistance may therefore develop contextually in primary school teachers under educational risks as they carry out their professional and pedagogical duties.

3. Neuropsychological Mechanisms of Teachers' Stress Resilience

Primary school teaching places considerable demands on educators. They often face emotional exhaustion, ongoing stress from educational reforms, and increasing digital workload. Their activity also requires sustained attention and strong empathy. As a result, it is necessary to clarify the neuropsychological mechanisms of stress resilience. It should help to develop some effective strategies to protect teachers' psychological well-being and enhance their professional performance.

The “fight-or-flight” response is a key factor in stress resilience. Indeed, stress can significantly complicate focus and decision-making. In this regard, You and Ogawa (2020) suggest physical activity and mindfulness exercises to support teachers' mental well-being. Aerobic exercise helps reduce anxiety and, thus, enable teachers to manage their emotions better.

In particular, several factors determine stress resilience among primary school teachers. Cognitive challenges are related to performing multiple tasks simultaneously. Emotional demands lie in creating favourable conditions in the classroom. Social pressures, including demands from parents and school leaders, also play a crucial role. Thus, neuropsychological resilience relies on strong self-regulation.

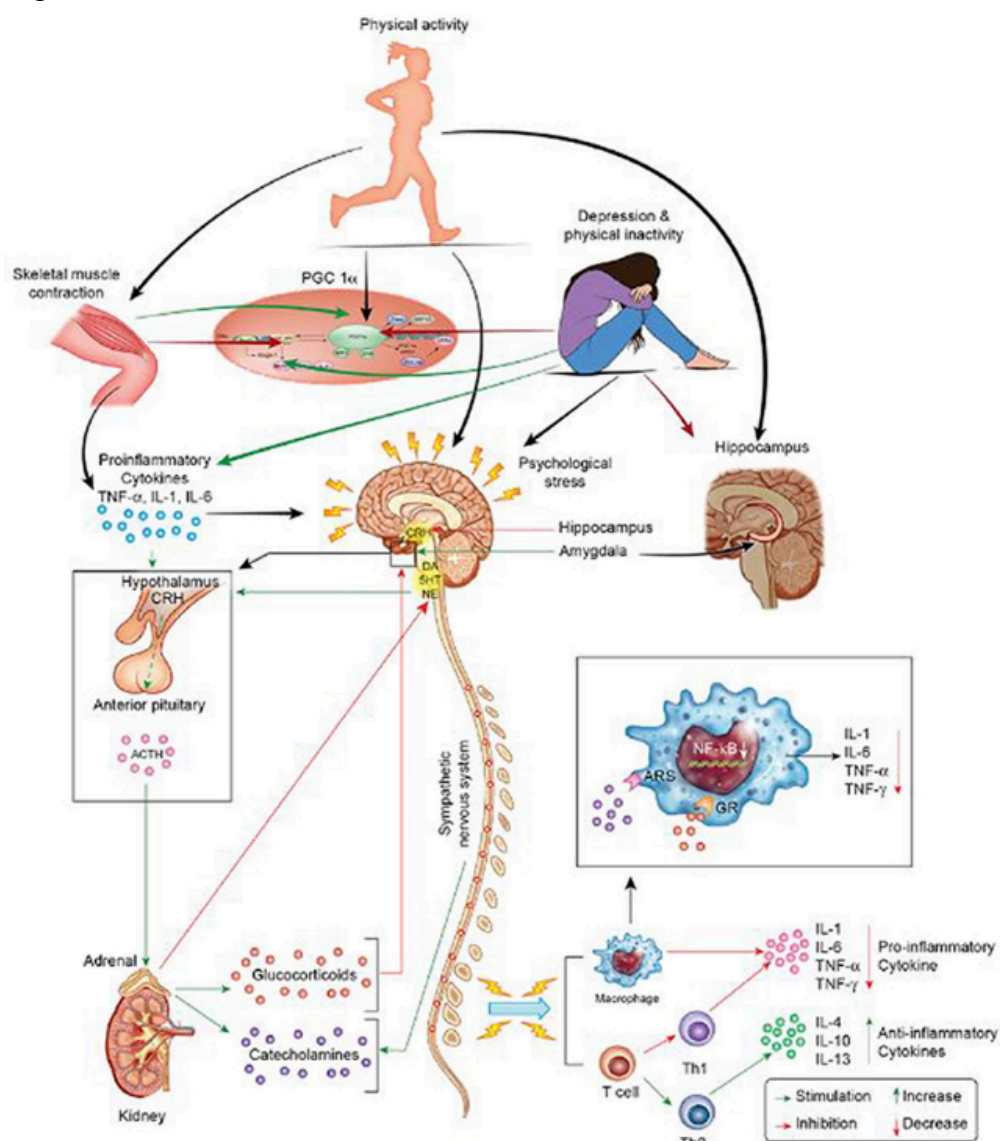


Figure 1. Neuropsychological mechanisms of stress resilience in primary school teachers

Source: the authors' own conceptualisation

As shown in Figure 1, the neuropsychological mechanisms underlying stress resilience in primary school teachers function through the interaction of several key brain systems. Stressful situations in the educational environment trigger a stress response and raise cortisol levels. Chronic stress and high cortisol levels can impair thinking, focus, and emotional control.

Effective stress resilience depends on balancing emotional responses with self-regulation. The amygdala drives emotional responses, while the prefrontal cortex helps manage emotions, make decisions, and regulate behaviour. Physical activity and mindfulness practices help reduce hyperactivation of the amygdala. At the same time, they strengthen the regulatory function of the prefrontal cortex.

Stress resilience is closely related to the ability to adjust to various changes. As for primary school teachers, resilience depends on coping with stress, controlling emotions, and meeting multiple challenges. These skills improve with regular exercise, emotional support, and a healthy lifestyle. Thus, stress resilience reflects the ability to manage challenging situations.

4. Educational Risks for Primary School Teachers

The educational environment is constantly changing due to social, economic, technological, and global crises. Primary school teachers are at the centre of these changes because their work is closely linked to the development of basic knowledge and skills in young children. At the same time, working with early childhood pupils and meeting high societal expectations for educational quality creates numerous professional challenges for teachers.

The stability of the education system depends on teachers' psycho-emotional well-being, their ability to adapt to change, and their capacity to achieve educational outcomes even in crisis situations. Studying educational risks makes it possible to identify key problems and develop tools to support teachers (Klassen & Tze, 2014).

The main risks faced by primary school teachers are varied and complex. It is important to note the undervaluation of the teaching profession. Technological challenges are connected with the rapid digitalisation. They are further intensified by a lack of resources for the effective use of these tools. Psycho-emotional risks are linked to chronic stress caused by working with young children, excessive workloads, and insufficient support. These factors can lead to high levels of emotional exhaustion. As for global risks, the consequences of the COVID-19 pandemic have intensified the gaps in educational attainment. Education funding is negatively affected by today's political and economic instability.

Primary school teachers face professional demands. They include adapting to reforms, applying new standards, integrating a competence-based curriculum, and supporting children with special educational needs. Teachers also face a shortage of specialised training needed for effective inclusion.

To address these challenges, teachers should receive support for their mental well-being through training in stress resilience and emotional regulation. Additional assistance can be provided through psychological support programmes initiated by educational institutions. Access to digital tools, focused training, and resource centres with current teaching materials can help lower educational risks. Reducing administrative burdens motivates teachers, while social programmes and financial incentives strengthen the profession's status.

5. Practical Recommendations for Building Stress Resilience in Primary School Teachers

Primary school teachers often experience high stress because their work involves strong emotional engagement, constant mental effort, and intensive interaction with others. Increasing expectations from society and school leadership intensify this pressure and raise risks to teachers' well-being. In this regard, it is important to highlight the role of physical activity in improving stress resilience skills. Its main goal lies in supporting mental stability and enhancing physical health (Maksymchuk et al., 2020).

Physical activity influences the ways of dealing with stress. In particular, one can decrease stress levels and enhance brain function with the help of regular exercise. It creates positive conditions for adjusting to existing challenges. Moreover, these conditions contribute to reducing anxiety and increasing motivation (Pavlyk & Radzimovska, 2023).

There are many types of physical exercise that help manage stress. Running and swimming improve blood flow and increase energy. Yoga consists of gentle movements and controlled breathing, which help strengthen self-control. It is advisable to practise deep breathing since such activity helps one to relax more easily. Thus, physical activity is a potential way to strengthen stress resilience among primary school teachers. Given that the above-mentioned practices decrease stress and support mental clarity, they should be incorporated into daily life. They will help teachers to handle the existing challenges and strive for professional development.

Primary school teachers can increase stress resilience with aerobic exercises, characterised by various advantages. They lower the risk of heart problems and increase energy. They also enhance focus and memory. As noted by Chow and Wu (2019), such activities can be readily performed outdoors or in a gym, and generally require no special equipment.

Mindfulness exercises are another way to build stress resilience. They help strengthen self-awareness and self-regulation (Berbets et al., 2021). Besides, they allow educators to recognise their feelings and body sensations. An important technique is the “body scan”, which teaches them to observe these sensations without judgment. Such simple practices as listening to music or eating mindfully can also increase their awareness of the surroundings.

Therefore, these exercises are particularly valuable as they improve stress management skills and help maintain emotional balance. They can be applied at work, or in leisure activities.

6. Discussion

The theoretical analysis allowed systematising scientific approaches to stress resilience in primary school teachers working under educational risks. It also highlighted the value of a neuropsychological perspective for studying this issue. The present findings reinforce psycho-pedagogical and neuropsychological research, which conceptualises stress resilience as a multi-component personality trait shaped by internal and external factors.

A review of educational risks shows that primary school teachers deal with emotional, cognitive, and social demands. Such a combination can reduce stress resilience and lead to professional burnout. These results confirm earlier studies (Gu & Day, 2007; Skaalvik & Skaalvik, 2017), which indicate that teachers are particularly vulnerable to stress-inducing factors in educational settings.

The article also examines the brain-based processes that support stress resilience. Particular attention is paid to the body's stress response, the brain's adaptability, and the chemical processes that influence emotions. Physical activity is shown to help lower chronic stress and improve teachers' ability to adapt. The obtained results confirm that aerobic exercise, mindfulness, and movement-based practices can increase cognitive performance and emotional well-being. As a result, they can be implemented within advanced teacher training and psychological support programmes.

Future research should focus on psychodiagnostic methods used to assess stress resilience in primary school teachers. It should also involve creating and validating neuropsychological support programmes that rely on physical activity and cognitive-behavioural strategies. Additionally, it is important to investigate how digital workload and remote learning affect teachers' mental and emotional well-being. This is particularly relevant given ongoing changes in the educational environment.

7. Conclusions

This article examines the main educational risks that negatively affect the professional activity of primary school teachers. These risks include emotional overload, high demands for pedagogical competence, and social difficulties arising from interpersonal relationships within the school community. Furthermore, new educational policies force teachers to update their professional knowledge, abilities, and skills.

As can be seen, the effectiveness of teaching largely depends on stress resilience. This quality maintains emotional balance and enables adjustment to changing conditions. Its development depends on several pedagogical factors. They include a positive school climate, professional support from colleagues, access to self-development resources, and strong emotional intelligence.

Psychological processes that ensure mood stability, motivation, and emotional well-being play a key role in coping with stress. Cognitive flexibility also contributes to developing the ability to adjust to rapid changes. At the same time, physical activity is another effective way of promoting stress resilience. It helps reduce stress and increases endurance. It follows that teachers with strong emotional stability manage professional challenges more effectively.

Nevertheless, it is imperative to recognise teachers' differences to develop stress resilience. Special emphasis should be placed on mental and physical health. Finally, despite ongoing challenges, the educational process should remain effective.

Statement on the Use of Artificial Intelligence

The authors declare that artificial intelligence (ChatGPT, OpenAI) was employed to explore ideas and enhance the clarity and readability of the text. All interpretation of the findings was conducted solely by the authors.

References

- Berbets, T., Berbets, V., Babii, I., Chyrva, O., Malykhin, A., Sushentseva, L., Medynskii, S., Riaboshapka, O., Matviichuk, T., Solovyov, V., Maksymchuk, I., & Maksymchuk, B. (2021). *Developing independent creativity in pupils: Neuroscientific discourse and Ukraine's experience*. BRAIN. Broad Research in Artificial Intelligence and Neuroscience, 12(4), 314–328. <https://doi.org/10.18662/brain/12.4/252>
- Bohdanov, S. O., Hirnyk, A. M., Zaleska, O. V., Ivaniuk, I. V., Soloviova, V. V., Chernobrovkina, V. A., & Chernobrovkin, V. M. (2017). *Pidhotovka vchyteliv do rozvytku zhyttiistiikosti/stressostiikosti u dithei v osvitnikh navchalnykh zakladakh* [Teacher training for the development of vitality/stress resistance in children in educational institutions]. Pulsary. https://lib.iitta.gov.ua/id/eprint/707663/1/Bohdanov2017_1.pdf
- Chow, H.-W., & Wu, D.-R. (2019). *Outdoor fitness equipment usage behaviors in natural settings*. *International Journal of Environmental Research and Public Health*, 16(3), Article 391. <https://doi.org/10.3390/ijerph16030391>
- Day, C., & Gu, Q. (2010). *The new lives of teachers*. Routledge. <https://www.routledge.com/The-New-Lives-of-Teachers/Day-Gu/p/book/9780415484602>
- Day, C., & Gu, Q. (2014). *Resilient teachers, resilient schools: Building and sustaining quality in testing times*. Routledge.
- Fabrizio, C., Picerni, E., Laricchiuta, D., Decandia, D., Piras, F., Termine, A., Spalletta, G., Petrosini, L., & Cutuli, D. (2025). *Psychological and neuro-morphological predictors of resilience in healthy adults: The whole is more than the sum of its parts*. *Frontiers in Neuroscience*, 19, Article 1597835. <https://doi.org/10.3389/fnins.2025.1597835>
- Gu, Q., & Day, C. (2007). *Teachers' resilience: A necessary condition for effectiveness*. *Teaching and Teacher Education*, 23(8), 1302–1316. <https://doi.org/10.1016/j.tate.2006.06.006>
- James, K. A., Stromin, J. I., Steenkamp, N., & Combrinck, M. I. (2023). *Understanding the relationships between physiological and psychosocial stress, cortisol and cognition*.

Frontiers in Endocrinology, 14, Article 1085950.
<https://doi.org/10.3389/fendo.2023.1085950>

- Jennings, P. A., & Greenberg, M. T. (2009). *The prosocial classroom: Teacher social and emotional competence in relation to student and classroom outcomes. Review of Educational Research*, 79(1), 491–525. <https://doi.org/10.3102/0034654308325693>
- Klassen, R. M., & Chiu, M. M. (2010). *Effects on teachers' self-efficacy and job satisfaction: Teacher gender, years of experience, and job stress. Journal of Educational Psychology*, 102(3), 741–756. <https://doi.org/10.1037/a0019237>
- Klassen, R. M., & Tze, V. M. C. (2014). *Teachers' self-efficacy, personality, and teaching effectiveness: A meta-analysis. Educational Research Review*, 12, 59–76. <https://doi.org/10.1016/j.edurev.2014.06.001>
- Maksymchuk, B., Matviichuk, T., Solovyov, V., Davydenko, H., Soichuk, R., Khurtenko, O., Groshovenko, O., Stepanchenko, N., Andriychuk, Y., Grygorenko, T., Duka, T., Pidlypniak, I., Gurevych, R., Kuzmenko, V., & Maksymchuk, I. (2020). *Developing healthcare competency in future teachers. Revista Românească pentru Educație Multidimensională [Romanian Journal for Multidimensional Education]*, 12(3), 24–43. <https://doi.org/10.18662/rrem/12.3/307>
- Pavlyk, N. V., & Radzimovska, O. V. (2023). *Psykhologichne zdorovia vchytelia Novoi ukrainskoi shkoly yak pidgruntia yoho psykhologichnoi hotovnosti do tvorchoi profesiinoi diialnosti [Psychological health of teachers of the New Ukrainian School as the basis of their psychological readiness for creative professional activity]. Insait: psykhologichni vymiry suspilstva [Insight: The Psychological Dimensions of Society]*, 9, 130–147. <https://doi.org/10.32999/KSU2663-970X/2023-9-8>
- Skaalvik, E. M., & Skaalvik, S. (2017). *Teacher stress and teacher self-efficacy: Relations and consequences*. In T. McIntyre, S. McIntyre, & D. Francis (Eds.), *Educator stress: Aligning perspectives on health, safety and well-being* (pp. 55–73). Springer. https://doi.org/10.1007/978-3-319-53053-6_5
- You, T., & Ogawa, E. F. (2020). *Effects of meditation and mind-body exercise on brain-derived neurotrophic factor: A literature review of human experimental studies. Sports Medicine and Health Science*, 2(1), 7–9. <https://doi.org/10.1016/j.smhs.2020.03.001>