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Theoretical and methodological aspects of mental health support for children with hearing impairments under conditions of prolonged stressful influence

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Abstract. The period 2015–2025 was a time of fundamental transformation of the system of physical education of children with hearing impairments, caused by a paradigm shift from correctional and pedagogical to rehabilitation and security. The impact of global crisis factors – the COVID-19 pandemic and long-term military and environmental stress – has actualized the search for new strategies of social protection and psychological support for this vulnerable category of the younger generation. *The purpose of the study* is the scientific substantiation of the conceptual transformation of physical education for children with hearing impairments in conditions of long-term combined stress. *Methods of research:* theoretical analysis and systematization of scientific data, systemic analysis, hermeneutic analysis of the regulatory and legal framework. *Results of research.* Three stages of development of scientific knowledge of the problem are identified: basic (stabilization), modified (anti-crisis/distance) and globally transformed (rehabilitation). It was established that the current stage (2022–2025) is characterized by a critical impact of neurosensory factors (vibration load) and anthropogenic-military threats on the process of physical education of children with hearing impairments. The feasibility of implementing a rehabilitation-resilience model based on the use of health and recreational activities in the natural environment (“green zones”) and the application of a two-track inclusion model for social reintegration is substantiated. *Conclusions.* It is proven that in the conditions of modern challenges, adaptive sports are transformed into a strategic means of psychological rehabilitation, where a healthy lifestyle acts as a separate, full-fledged component of the support system for children with hearing impairments.

Keywords: children with hearing impairments, physical education, adaptive sports, combined stress, “green zones”, inclusive physical culture, psychological resilience, health-forming technologies.

Теоретичні та методологічні аспекти підтримки ментального здоров'я дітей з порушеннями слуху в умовах тривалого стресового впливу

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Резюме. Протягом 2015–2025 років система фізичного виховання дітей із порушеннями слуху зазнала глибоких змін, перейшовши від традиційних корекцій-

но-педагогічних підходів до нової парадигми, орієнтованої на реабілітацію та безпеку. Такі масштабні виклики, як пандемія COVID-19 у поєднанні з хронічним військовим та екологічним стресом, зумовили гостру потребу в розробці новітніх механізмів соціального захисту й психологічної допомоги для цієї вразливої групи молоді. *Мета дослідження* – наукове обґрунтування концептуальної трансформації системи фізичного виховання дітей з порушеннями слуху в умовах довготривалого комбінованого стресу. *Методи дослідження*: теоретичний аналіз та систематизація наукових даних, системний аналіз, герменевтичний аналіз нормативно-правової бази. *Результати дослідження*. У процесі вивчення проблеми виокремлено три послідовні періоди еволюції наукових поглядів: стабілізаційний (базовий), дистанційний (антикризовий) та реабілітаційний (глобально-трансформований). З'ясовано, що для поточного етапу (2022–2025 рр.) визначальним є деструктивний вплив воєнно-антропогенних загроз та специфічних нейро-сенсорних подразників (зокрема, вібраційних навантажень) на рухову активність дітей із порушеннями слуху. У цьому контексті доведено перспективність застосування реабілітаційно-резильєнтної моделі, ядром якої є оздоровча та рекреаційна діяльність у природному середовищі («зелених зонах»), а також інтеграція двоколіїної інклюзивної моделі для успішного повернення дітей у соціум. *Висновки*. Підтверджено, що на тлі сучасних кризових умов адаптивна фізична культура перетворюється на ключовий інструмент психологічного відновлення. При цьому формування навичок здорового способу життя стає самостійним, невід'ємним елементом комплексної системи підтримки дітей із порушеннями слуху.

Ключові слова: діти з порушеннями слуху, фізичне виховання, адаптивний спорт, комбінований стрес, «зелені зони», інклюзивна фізична культура, психологічна резильєнтність, здоров'яформувальні технології.

Problem statement. At the current stage of societal development, the issue of physical education for children with special educational needs is acquiring the features of a global challenge [6; 9]. The World Health Organization, in its strategies, defines physical activity as a fundamental factor in preserving the gene pool and preventing non-communicable diseases [27]. However, for children with hearing impairments, who constitute one of the most vulnerable categories, the process of engaging in physical activity is complicated by a number of endogenous and exogenous factors [10; 29].

The relevance of our study has a dual nature.

– On the one hand, it is due to the need to develop and improve health-forming technologies for children in whom hearing impairments primarily provoke secondary developmental deviations: disorders of static kinetic stability, coordination of movements, and spatial orientation [5; 7; 30]. Studies confirm that such children have significantly lower balance indicators compared to their hearing peers, which requires specific corrective approaches [23].

– On the other hand, the viability of existing methods is currently being tested under extreme conditions of combined stress: if ten years ago the focus of scientific research lay in the plane of correctional and pedagogical expediency and

the systematization of adaptive approaches, the COVID-19 pandemic and subsequent military aggression have radically changed the vector of the issue [2; 4].

The transition to distance education and forced isolation have led to mass physical inactivity, technological maladaptation, and an increase in psychosomatic disorders. The new legislative field, in particular the Law of Ukraine “On Physical Culture and Sports” and the standards of the “New Ukrainian School”, require the education system to ensure the real inclusion and socialization of children with disabilities. However, the practical implementation of these requirements faces the traditional system’s unreadiness to work under conditions of anthropogenic and military threats. There is an urgent need for the scientific substantiation of new organizational forms, such as the use of health and recreational activities in “green zones” and the introduction of inclusive sports games, which have proven their effectiveness as means of communication and socialization [1; 3; 14]. The need to create a holistic concept that combines the correction of physical condition with the formation of psychological resilience under conditions of long-term stress constitutes the essence of the scientific problem.

Analysis of recent research and publications. The issue of physical education and

rehabilitation of children with hearing impairments has been the subject of deep scientific research, which over the last decade has undergone a significant substantive transformation [3; 4; 25]. Systematization of scientific sources allows us to identify several key vectors of research that form the theoretical basis of our work [12; 15].

A significant body of work is devoted to the study of the psychophysiological characteristics of children with hearing impairments. Forostian O. I. (2015) determined the theoretical and methodological foundations of adaptive physical education, emphasizing the need to correct secondary deviations in the health status of persons with disabilities [5; 13]. Foreign researchers, including Azevedo M.G. (2009) and Patel H. (2017), have experimentally confirmed that children with hearing impairments have significantly lower indicators of statokinetic stability and dynamic balance compared to hearing peers, which is explained by vestibular apparatus dysfunction [7; 11; 23]. A. Zwierzchowska (2004) points to the reduced energetic and coordination abilities of this category of schoolchildren, which requires specific means of correction [30].

A retrospective analysis of the dynamics of scientific research for the period 2015–2025 showed a clear evolution of priorities caused by external crisis factors. An important direction is the introduction of endoecological approaches, which consider health formation in interconnection with the environment [4]. Modern studies (Vaskan I., Tsyba Yu., 2025) point to the need to use health and recreational activities in “green zones” (parks, stadiums) as a means of countering the consequences of anthropogenic and military threats and compensating for hypoxia caused by prolonged stays in enclosed environments (in particular, shelters).

Purpose and objectives of the study. The purpose of the study is the scientific substantiation of the conceptual transformation of physical education for children with hearing impairments in conditions of long-term combined stress.

The implementation of this goal was carried out within the following tasks:

1. To conduct a retrospective analysis of the evolution of theoretical prerequisites for health-forming technologies for children with hearing impairments.

2. To determine the specific impact of combined stress on the psychophysiological state of children with hearing impairments.

3. To substantiate the expediency of a rehabilitation-resilience model of adaptive sports in the physical education process of children with hearing impairments.

To solve the set tasks, a complex of mutually complementary methods was used:

- theoretical analysis and generalization of scientific and methodological literature were employed to study the state of problem development in adaptive physical education and health-forming technologies;

- systemic analysis was used to structure the stages of development of scientific knowledge of the prerequisites and to identify the relationships between social challenges and pedagogical responses;

- hermeneutic analysis of the regulatory and legal framework was included to interpret new legislative norms in the context of reforming the New Ukrainian School.

Research results. A systemic analysis of the transformation of scientific views on the physical education of children with hearing impairments allowed us to distinguish three key stages in the development of the prerequisites for health-forming technologies.

The first stage (2015–2020): basic structure of scientific knowledge. This period was characterized by the relative stability of the educational system, where the main task was the implementation of inclusion and the improvement of correctional methods (Fig. 1).

The analysis shows that in the first stage, scientific research was focused on harmonizing the child’s development in accordance with medical and educational norms. As noted by researchers [2; 5], the main goal was to lay a methodological foundation that takes into account the specifics of sensory deprivation (impaired balance, coordination) to ensure safe social adaptation in the future [4; 28]. The basic architecture of scientific knowledge of the problem, which formed in the pre-crisis period, focused on creating a fundamental theoretical platform for adaptive physical education, viewing it as a stable system.

Categories of prerequisites for the first stage:

- The block of social prerequisites combined two critically important vectors: the *socio-pedagogical aspect* determined the strategy for implementing inclusion, where the main emphasis was on adapting educational programs and

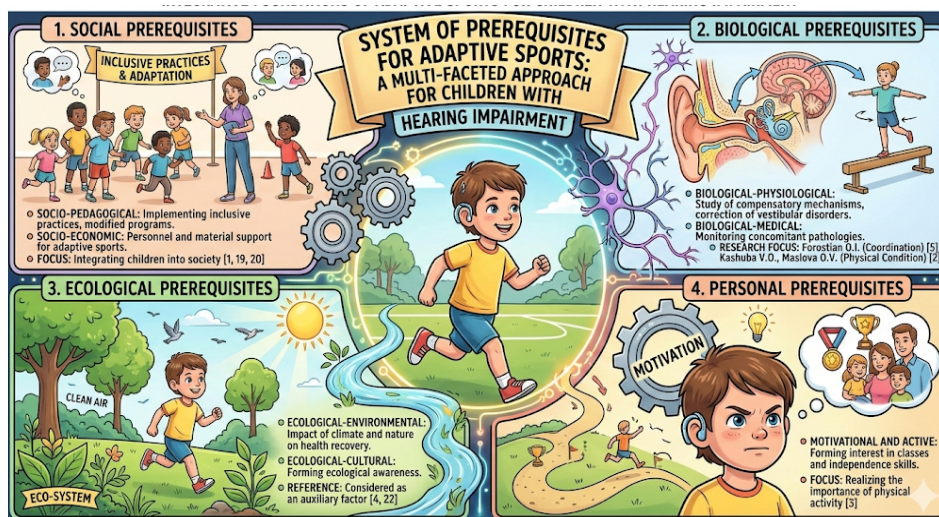


Fig. 1. Basic structure of the prerequisites for health-forming technologies: first stage (2015–2020)*

Note: * – generated from the data obtained through systemic analysis by artificial intelligence model Gemini Pro

integrating children with hearing impairments into the general educational space, which required the development of special communication methods; the *socio-economic aspect* concerned state support, focusing on the need for targeted funding of adaptive sports and ensuring the accessibility of specialized facilities, which was a prerequisite for launching systemic changes.

– The block of biological prerequisites included medical and biological aspects: the *biological-physiological component* focused on studying the deep mechanisms of compensation for lost auditory function through the correction of coordination and balance disorders, which are typical secondary deviations in deafness; the *biological-medical component* provided for mandatory diagnosis of concomitant pathologies and medical support of the training process to prevent injury.

– The block of ecological prerequisites considered ecology in the classic sense: the *ecological-environmental approach* took into account the impact of climatic conditions and air quality on the effectiveness of health recovery; the *ecological-cultural approach* aimed to form ecological awareness in children and a responsible attitude not only to nature but also to their own body as part of an ecosystem.

– The block of personal prerequisites determined the specifics of the psychological readiness of the examined contingent of children:

the *personal-motivational component* was aimed at overcoming the inferiority complex and forming a stable interest in sports; the *personal-active component* involved the development of self-control skills and the ability to independently organize one's physical activity, which is the basis for a future autonomous life.

Thus, the structure of prerequisites of the first stage had a clearly defined correctional and developmental character. It was designed for the stable functioning of the educational system, where the main goal was the harmonization of the physical development of the child and their systematic integration into society. This base became the foundation upon which the anti-crisis transformation of the system was subsequently built.

The second stage (2020–2022): modified anti-crisis structure. This period was forcedly formed as a result of the global pandemic and the transition to distance learning, which forced the transformation of the basic structure (Fig. 2).

This period was marked by the transition of the educational system into “online” mode, which created fundamentally new challenges for children with hearing impairments, who are critically dependent on visual and tactile contact.

The details of transformations by prerequisite categories included the following changes:

– The block of biological prerequisites – the category expanded due to the emergence of new health threats: the focus of research shifted to the

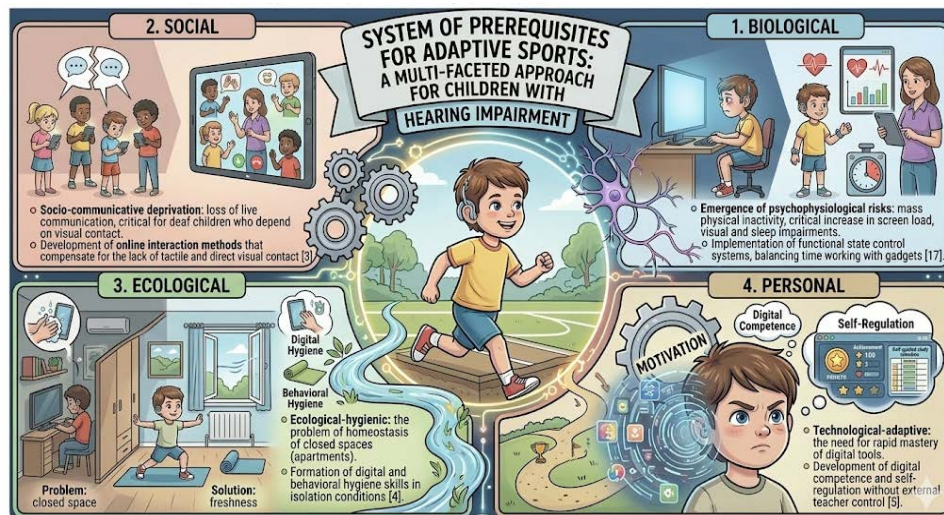


Fig. 2. Modification of prerequisites in conditions of the pandemic and distance education form: the second stage (2020–2022)*

Note: * – generated from the data obtained through systemic analysis by artificial intelligence model Gemini Pro

risks for the immune system (*immunological load*), caused by the viral threat and a sharp restriction of physical activity (quarantine restrictions); highlighted the problem of "screen fatigue" and visual impairment (*psychophysiological aspect, screen load*) for children with hearing impairments, in whom vision is the main channel of information perception; many hours spent in front of a monitor led to sensory overload and the depletion of the body's adaptive reserves.

– The block of social prerequisites – the destruction of the usual socialization mechanisms: *socio-communicative deprivation* showed that the lack of live communication became a critical problem for children with hearing impairments, as the distance form of education could not fully replace direct interaction and led to deepening isolation and regression in communication skills; the *socio-pedagogical aspect (distance correction)* emphasized the need for urgent development of distance physical education methods that would allow the teacher to control the correctness of educational tasks "through the screen".

– The block of ecological prerequisites – transformation of the concept of "ecology" from a global dimension to a local one: the *ecological-hygienic aspect* noted the emergence of "closed space hygiene" and digital hygiene into the foreground; the aspect of *stability of the "homeostasis" of closed space* determined the

impact of prolonged indoor stays on the child's physical and psychological state.

– The block of personal prerequisites – increased requirements for the personal qualities of the child: *technological-adaptive competence* included the need to quickly master digital tools (Zoom, Google Meet) not only for education but also for physical culture and sports; the *personal-motivational aspect (self-regulation)* highlighted the orientation towards the child's critically important ability for self-motivation and independent support of physical activity under conditions of isolation and the absence of external control by the teacher/coach.

Thus, the transition from the "development" strategy to the "anti-crisis adaptation" strategy meant that the very goal of the second stage was not so much improving physical conditions as preserving the achieved level of health and preventing maladaptation in conditions of total digitalization and social isolation.

The third stage (2022–2025): global structural transformation. This period determined the most radical changes that occurred under the influence of combined stress as a result of military actions (Fig. 3).

As can be seen, the current stage requires a transition to a rehabilitation-resilience model. According to the new Law of Ukraine "On Physical Culture and Sports" (2025), adaptive sports acquire the function of an instrument of

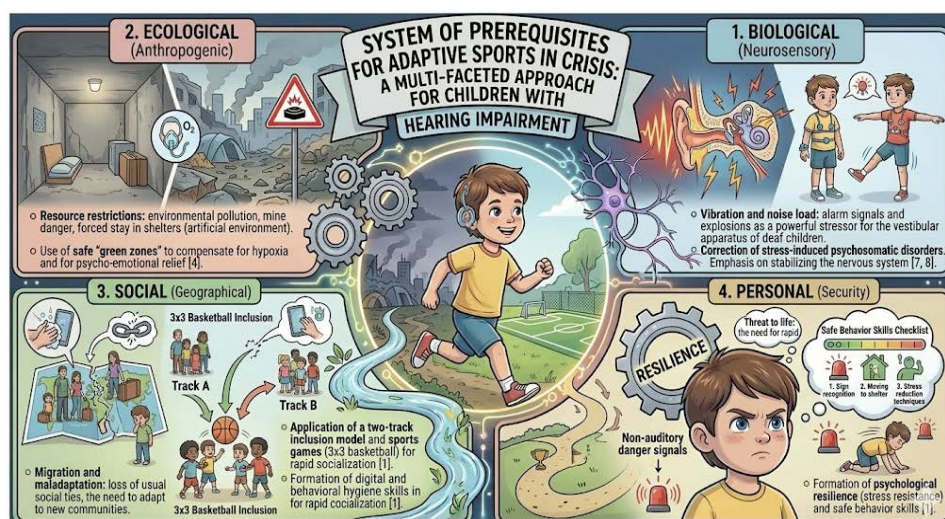


Fig. 3. Transformation of prerequisites in conditions of long-term military and environmental stress: the third stage (2022–2025) *

Note: * – generated from the data obtained through systemic analysis by artificial intelligence model Gemini Pro

psychological rehabilitation. The analytical data presented by us reflect a radical restructuring of the conceptual foundations of physical education, caused by conditions of combined long-term stress – full-scale military aggression and the accompanying environmental crisis.

Details of transformations by categories of prerequisites are as follows:

– The block of biological prerequisites – a shift of priorities from “classical” concomitant pathologies (posture disorders; reduced muscle tone, visual impairment) to those formed during the war (nervous system damage): *neurosensory sensitivity* determined the specific vulnerability of children with hearing impairments to vibration loading, because the body compensates for damage to the auditory analyzer with increased tactile and vibration sensitivity, so alarm signals, blast waves, and the operation of heavy machinery become a powerful stressor that exacerbates vestibular dysfunctions (dizziness, loss of balance); *stress-induced disorders* dictate the growth of psychosomatic disorders (muscle spasms, sleep disturbances, respiratory deterioration) as the body’s reaction to chronic danger.

– The block of ecological prerequisites – acquiring critical importance due to the change in living environment: *resource restrictions and hypoxia* define the consequences of a forced stay in bomb shelters and hideouts (an artificial, closed environment); the *strategy of “green zones”*

emphasizes the need to use safe natural locations (parks, squares) for health and recreational activity, which are now considered a therapeutic space for compensating the consequences of staying in shelters and reducing stress levels.

– The block of social prerequisites – a change of context due to mass population displacement: *migration challenges* define the requirement of constant readaptation to new conditions, the loss of usual social ties, and the communicative environment; the *two-track model* aims at rapid integration through the combination of correctional classes with joint games involving local children, utilizing communication through action and visual signals, thereby neutralizing the language barrier.

– The block of personal prerequisites – reorientation from “success” to “resilience”: *psychological resilience* defines the formation of an internal support system and the ability to withstand traumatic experiences through physical activity; *security competence* brings to the forefront skills in spatial orientation within shelters, rapid reaction to visual danger signals, and self-control in extreme situations.

Thus, the third stage emphasizes the transition to a rehabilitation-resilience model, which is based on the new 2025 legislation defining adaptive sports as a means of social protection. The key idea of the stage: preserving the mental and physical health of the child through integration into a safe natural environment (“green zones”)

and the application of inclusive sports technologies.

Summarizing the results of the analysis of the evolution of theoretical prerequisites, it can be argued that over the period 2015–2025, there was a fundamental paradigm shift in the physical education of children with hearing impairments: from local correctional tasks to a global strategy of survival and rehabilitation. The proposed rehabilitation-resilience model, which integrates the health-promoting potential of “green zones”, the socializing effect of inclusive sports games, and modern digital monitoring tools, acts as a non-alternative response to the challenges of long-term combined stress. This transformation is fully consistent with the new legislative field of Ukraine, which reclassifies adaptive sports from a means of physical development to an instrument of social protection, psychological stability, and full integration into society.

Conclusions. As a result of a systemic analysis of the evolution of scientific views, it was established that the concept of physical education for children with hearing impairments has undergone a fundamental transformation: from a basic correctional-developmental model (until 2020) to an anti-crisis one (2020–2022) and, ultimately, to a rehabilitation-resilience model (2022–2025). This change is due to the need to adapt to the conditions of long-term combined stress (military and environmental).

It is proven that under conditions of anthropogenic and military threats, the legislative and methodological consolidation of adaptive sports as a tool for psychological rehabilitation is critically important. According to the Law of Ukraine “On Physical Culture and Sports”, the priority is not only physical development but also the achievement of social independence and integration into society. This requires the allocation of a

healthy lifestyle as a separate, full-fledged component of adaptive physical culture.

The effectiveness of implementing an integrated approach that combines health and recreational activity in “green zones” with the use of inclusive means, for example, sports games, is substantiated. The use of the natural environment allows compensating for the consequences of staying in closed spaces and neutralizing environmental stress. Separately, it is determined that a specific biological prerequisite of the current stage is the high neurosensory sensitivity of children with hearing impairments to vibration load, which exacerbates vestibular dysfunctions. This requires the implementation of a system of enhanced control over the body’s adaptive capabilities to prevent hyperactivity and exhaustion of the nervous system.

The obtained results open a new field for scientific research aimed at the practical implementation of the substantiated model. It is advisable to focus further research on the following areas:

- the development of safety protocols and spatial orientation methods for children with hearing impairments during classes in open locations under martial law conditions (algorithms of actions during alarm signals, taking into account sensory deprivation);

- studying the impact of organized physical activity in “green zones” on the indicators of the musculoskeletal and cardiorespiratory systems of children with hearing impairments who have been in an artificially controlled environment for a long time;

- substantiating a system for training pedagogical personnel capable of combining the competencies of a coach, rehabilitator, and tutor, ready to work under conditions of inclusion and increased psychogenic load, as required by the standards of the New Ukrainian School.

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