

## Special coordination exercises in the track and field athletics training program for pupils with special needs

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### Abstract:

*Material:* 18 pupils of the Communal Institution “Bohodukhiv Special Educational Complex” of the Kharkiv Regional Council took part in the research. The experimental work was attended by 10 pupils aged 9-10 years, 8 pupils aged 13-15 years with disabilities in mental development, who are engaged in the sports section “general physical training”. The author’s training program on track and field athletics was introduced in the experiment, which was developed for athletes with a deviation in the mental development of a special educational institution. The training program was based on scientific publications, personal experience, a survey of physical culture teachers who have experience working with the appropriate level of physical development and physical fitness of mentally retarded pupils. *Results:* the application of the author’s training program on track and field athletics in training exercises with sportsmen who have a deviation in mental development, contributed to the mastery of skills in dexterity, speed, jumping, correct foot placement, torso position, coordination abilities, increased motor fitness, and spatial orientation indicators. An eight-week training program on track and field athletics was introduced with the duration of up to two hours for pupils with a deviation in mental development. Gradual preparation of the musculoskeletal system for physical activity contributed to the improvement of test sports indicators in reaction speed and dexterity, coordination abilities of pupils of the sports section. The developed recommendations for physical culture teachers aimed at conducting classes with pupils with special needs, which take into account the emotional state, physical fitness of persons with various deviations, which take into account the emotional state, physical fitness of persons with various deviations. *Conclusions:* the introduction into the educational process of the author’s training program of pupils with mental retardation, taking into account the individual features of psychophysical development, creates optimal conditions for increasing motor fitness and indicators of spatial orientation. The proposed recommendations to physical culture teachers, which allow conducting training sessions taking into account the individual features of the psychophysical development of pupils with special needs.

**Keywords:** coordination abilities, spatial orientation, speed, dexterity.

### Introduction

Mental retardation, as defined by the International Classification of Diseases of WHO, is a state of delay or insufficient development of the psyche, which is manifested during the period of development by cognitive insufficiency, language, motor and social skills. But the definition of mental retardation is most often used that was proposed by the American Association for Mental Inferiority. “Mental retardation represents overall intellectual development well below average, combined with deficits in adaptive behavior that are detected during body development”[2,8].

Today, track and field athletics is an accessible mass sport of physical education and sports activities. Analyzing track and field athletics training programs for sportsmen who have a deviation in mental development, it is necessary to note the existing shortcomings in the preparatory part of the classes. Pupils engaged in the sports section “general physical training” don’t have a sufficient level of skills of this kind of sport. It should be noted that training programs designed specifically for pupils with special needs contribute to the mastery of skills in dexterity, speed, jumping, correct foot placement, torso position, coordination abilities, improvement of motor fitness, and spatial orientation indicators. Training programs are designed to improve sports results and don’t take into account the assimilation of minimum skills in track and field athletics and admission to participate in competitions [1,3].

Coordination abilities are the weakest link is in the physical fitness of persons with various deviations: balance, fine motor skills, relaxation, the rhythmicity of movements, and others. These abilities need to be extensively developed to compensate for the lack of movement. Practice shows that persons with intellectual disabilities need training in movements that require coordination abilities [7,19].

It was established that the main violation of the motor sphere of children with mental disabilities is a movement coordination disorder. Both simple and complex movements cause difficulties in children: in one case, you need to accurately perform any movement or pose, in the other, measure the distance visually and hit the desired target, in the third - measure and make a jump, in the fourth - accurately reproduce the given rhythm of movement [5,9].

An effective solution to this problem is the use of special coordination exercises in physical education programs aimed at differentiating spatial parameters of motion, force parameters of motion, orientation in space, kinesthetic ability.

Means of developmental and corrective influence are used to form spatial parameters of movement: walking is aimed at developing the basic movements of a child, forming the ability to properly hold the body, adhere to the rhythm of walking, improving the coordinated movements of hands and legs; running - allows you to master the skills of coordinated management of all the actions of corps, forms ease and grace with the quick movement of a child; throwing, catching - the development of a hand stimulates the formation of other motor functions of the body, activating all the mental activity of a child and this is of particular importance for correcting deviations in the psychomotor sphere of children with mental retardation [4,6,19].

The observations, which were made with pupils of the Communal Institution "Bohodukhiv Special Educational Complex" of the Kharkiv Regional Council are opened by a number of problems of the pupils connected with features of physical fitness with different degrees of deviation of health status. The problem consists in the coordination abilities of pupils with special needs – they are balance, motility, excess slackness, the rhythm of movements, and others. Preparation of the musculoskeletal system for physical activity is of great importance when scientists carry out with satisfaction, perceiving performance of exercises without psychological load. Running coordination abilities intensively develop when material moves in an informative context of assimilation during track and field athletics training which gives the chance to compensate for the shortage of movements. The task of the teacher consists of a definition, with a considerable list of special running exercises, those exercises which will promote the effective manifestation of coordination abilities of pupils with defects of intelligence.

The analysis of scientific and methodical literature allows establishing the fact that recently domestic and abroad authors in their works even more often consider the question of physical education of pupils who have a deviation in physical and mental development. Indicators of physical development which indicate the need of accounting the individual data when determining the level of physical fitness of pupils are proved in the researches of Bondar I.R. Such approach allows differentiating the process of training during physical education classes and work of sports section. Special attention has to be paid to diagnostics of the psycho-emotional state of pupils [3].

Using different means of physical education for pupils with special needs are considered in researches of scientists: means of gymnastics, ski preparation, swimming, basketball, – A.G. Karabanov, 2000; outdoor and sports games – A.V. Tsios, 2002; development of the program of physical rehabilitation - N. Ye Mikhaylova, 2005; structure and contents of training programs of the Special Olympic Games in track and field athletics – Yu.A. Briskin, 2017; metodichne zabezpechennia sistem pidgotovki sportsmeniv Spetsialnih Olimpiad Perederii A, Pitn M. 2017; changes of motor preparedness and space orientation of pupils with physical defects – I.P. Pomeschikova, 2010; track and field athletics training program for sportsmen with a deviation of mental development O.O. Pavlos (2012); development of the differentiated program of physical rehabilitation – Ye. Labkovsky, 2013; ptimization of the processes of adaptation to the conditions of study at school as a component of health forming activities of primary school-age children - Kashuba, B., Futornyi, S., Andrieieva,O., Goncharova, N., Carp, I., Bondar, O., Nosova, N. 2018 [4,10,24].

However, authors light only fragmentary need of using supportive means of physical education for pupils with special needs, stating improvement of physical development and physical efficiency as a result of physical exercises. For this reason, the task of our research became the definition of sports training of the special running exercises at the initial stage which is directed to correction of running movements.

Different means of physical education, which specifically influence body state, are noted in the researches of Sheptytskyi. Klymovych, V., Olkhovyi, O., & Romanchuk, S. (2016), Labrador-Roca, V., Vázquez, J., Yuba, E. (2020), Prystupa Y, Perederiy A, Briskin Y, Pityn M. (2015), Gogin O.V. (2010), Ilyin E. P. (2011) Verzhikhovs'ka OM. (2016), Yılmaz, A., Kirimoglu, H., & Mirze, F. (2020), note features of influence on the higher nervous activity of sportsmen with disturbance of mental development, specify that influence isn't limited only to the motor sphere, but also concerns mental processes [11,15, 25]. The content of out-of-class forms of work by physical culture and sport is given in the training program of Kurtova, G. Yu., Arhipov, O. A, Korop, M. Yu., Gamov, V. G., & Vertel, O. V.: morning hygienic exercises; practices in sports and recreational sections; participation in sports-recreational and sports-mass actions [13]. The introduced author's track and field athletics training program was developed for sportsmen with a deviation in mental development (various degrees of severity and with accompanying lesions) who don't have the skills in this kind of sport and have never engaged in it. The training program is designed to absorb the minimum skills in track and field athletics. The experiment was conducted in accordance with the content of an eight-week training program on track and

field athletics for sportsmen with a deviation in mental development (author's program Mulyk, K.V., Mulyk, V.V.) [18]. Three training sessions are planned each week. The duration of training sessions is mainly up to two hours, the duration of the main part is 60 minutes. There are offered complexes of general-developing exercises, special running exercises for flexibility and relaxation, exercises and games with the ball for motor fitness and spatial orientation of pupils with physical and mental disabilities.

#### **The purpose of the research**

*The purpose of the research* is to determine the effectiveness of special coordination exercises for pupils with special needs under the track and field athletics program, which affect the improvement of motor fitness, and spatial orientation indicators.

#### **Material and methods**

*Participants.* 18 pupils took part in the research: 10 pupils (5 boys, 5 girls) of the 4<sup>th</sup> grade, 8 pupils (4 boys, 4 girls) of the 8<sup>th</sup> grade with disabilities in the mental development of those engaged in the sports section "general physical training". The research was carried out on the basis of the Communal Institution "Bohodukhiv Special Educational Complex" of the Kharkiv Regional Council.

The following *research methods* were used in the work: analysis and synthesis of scientific and methodological literature, pedagogical observations, pedagogical testing, measurement, and modeling of a block of special running exercises.

#### **Procedure**

The pupils, participating in the research, were divided into 2 groups: E1- pupils of the 4<sup>th</sup> grade in the amount of 10 people aged 9-10 years (5 boys, 5 girls); E2- pupils of the 8<sup>th</sup> grade in the amount of 8 people aged 13-14 years (4 boys, 4 girls).

The research consisted of the following steps:

- creation of two experimental groups for;
- introduction of special orientation exercises in space;
- measurement of coordination abilities in throws on the accuracy and speed of the reaction and assessment of the degree of performance of participants in special coordination exercises;
- systematization and mathematical processing of data;
- providing conclusions and practical recommendations.

The program was designed for eight weeks. Three training sessions were held each week. The duration of training sessions was up to two hours, the duration of the main part - 60 minutes. There are offered complexes of general-developing exercises, special running exercises for flexibility and relaxation, exercises and games with the ball for motor fitness, and spatial orientation of pupils with physical and mental disabilities, the intensity of the exercises in the complex wasn't taken into account. When performing exercises, the teacher focused on the correct performance of the exercise and the desire to repeat the exercise.

It should be noted that the number of special coordination exercises in one lesson depended on the functional and psychological state of those who are engaged. The following sequence of exercises was used in the preparatory part of the lesson: warm-up: slow running, then general-developing exercises, special orienteering exercises in space. In the main part of the training session, lower intensity exercises were first performed, then gradually, depending on the readiness of the muscles of the higher intensity exercise. Or first, exercises were performed at half-speed after which their intensity increased.

All statistics were processed using Statgraphics Centurion 18 (version 18.1.11) for objective evaluation. The normality of the distribution was determined using Shapiro-Wilk test. Reliability was considered important at five percent significance values ( $p < 0,05$ ), 1% - significance values ( $p < 0,01$ ) and 0,1% - significance values ( $p < 0,001$ ). A Student test was used regarding the reliability of the differences in the studied indicators to test the statistical hypothesis.

#### **Results of the research**

The introduction of the author's program positively influenced *the development of coordination, speed abilities, and agility of experimental groups* (Table 1).

The repeated research revealed the positive effect of exercises and ball games on the development of coordination, speed abilities, and agility of experimental groups. The comparison of the coordination abilities of the fourth-grade pupils revealed a fairly effective influence of the applied program on the coordination abilities of the fourth-grade pupils. The reliable differences  $p < 0,01$  were observed in girls in all the examined indicators for determining the level of development of coordination abilities, except dexterity.

The most effective action of the applied program was observed in boys on the performance of tests for accuracy  $p < 0,01$ , reaction rate  $p < 0,01$ , speed-force ability, and agility  $p < 0,05-0,01$ .

The applied program helped to increase the result of girls in all tests. So, the increase in the accuracy of throws with a small ball in the vertical target was 89,1%, in the horizontal 94,7%. The increase in the accuracy of shots with a basketball ball in the vertical target was 35,7%, in the horizontal 31,3%. The frequency of movements increased by 13,0%.

**Table 1**

**Main indicators of coordination abilities of the pupils after the introduction of the program  
( $q = 0,05$ ).**

Criteria, indicators (nature of identification) of coordination capacities		Before the research		After the research		Confidence assessment	
		Groups E1	Groups E2	Groups E1	Groups E2	Groups E1	Groups E2
		$\bar{x}_1 \pm m_1$	$\bar{x}_2 \pm m_2$	$\bar{x}_2 \pm m_2$	$\bar{x}_2 \pm m_2$	p	p
<b>Accuracy throw to target (number of hits)</b>							
Small ball (out of 10 attempts) Vertical target	B	3,68±0,69	5,60±0,67	7,79±0,43	6,80±0,62	<0,01	>0,05
	G	4,33±0,49	5,62±0,69	8,19±0,28	6,31±0,53	<0,01	>0,05
Small ball (out of 10 attempts) Horizontal target	B	4,42±0,66	5,70±0,52	8,58±0,31	7,40±0,71	<0,01	>0,05
	G	4,76±0,58	6,46±0,57	9,27±0,28	7,31±0,57	<0,01	>0,05
Basketball ball (out of 20 attempts) Horizontal target	B	12,47±1,04	14,80±0,86	17,84±0,37	17,00±0,85	<0,01	>0,05
	G	14,05±0,81	13,62±1,23	19,05±0,23	14,69±1,14	<0,01	>0,05
Basketball ball (out of 20 attempts) Horizontal target	B	12,05±1,16	15,60±0,93	18,42±0,42	17,10±0,87	<0,01	>0,05
	G	14,76±0,77	13,54±1,19	19,38±0,19	15,23±1,07	<0,01	>0,05
<b>Frequency of movements</b>							
Tapping test (number of movements per 1 s.)	B	5,42±0,18	5,68±0,25	6,08±0,17	5,52±0,24	>0,05	>0,05
	G	5,32±0,15	5,50±0,14	6,01±0,11	5,51±0,14	<0,05	>0,05
<b>Reaction rate</b>							
1. To sound (s)	B	0,24±0,01	0,23±0,01	0,19±0,01	0,26±0,03	<0,01	>0,05
	G	0,24±0,01	0,23±0,01	0,18±0,01	0,41±0,17	<0,01	>0,05
2. To light (s)	B	0,31±0,01	0,32±0,01	0,25±0,01	0,55±0,23	<0,01	>0,05
	G	0,30±0,01	0,29±0,01	0,22±0,01	0,30±0,01	<0,01	>0,05
3. With choice (s)	B	0,46±0,01	0,45±0,01	0,36±0,01	0,48±0,02	<0,01	>0,05
	G	0,45±0,02	0,46±0,01	0,39±0,01	0,47±0,01	<0,01	>0,05
<b>High-speed power, dexterity</b>							
Standing long jump (cm).	B	130±2,35	174±2,41	145±2,35	178±1,58	<0,01	>0,05
	G	121,25±1,44	160±1,76	132,51±1,66	166±2,09	<0,01	>0,05
Shuttle run 4×9 (m).	B	14,72±0,12	12,08±0,13	14,27±0,08	11,9±0,11	<0,05	>0,05
	G	14,64±0,09	12,48±0,11	14,22±0,11	12,16±0,08	>0,05	>0,05

Note: B - boys; G - girls; Groups E1 - pupils of the 4<sup>th</sup> grade (5 boys, 5 girls); Groups E2 - pupils of the 8th grade (4 boys, 4 girls)

The increase in the result of a simple reaction to sound was 25,0%, to the visual signal 26,7%, a complex reaction with a choice of 13,3%. The increase in high-speed power abilities amounted to 9,3%. The level of agility increased by 2,9%. The increase in throwing accuracy indicators with a small ball in the vertical target was 99,1%, in the horizontal 94,1% for the fourth-grade boys. The increase in the accuracy of shots with a basketball ball in the vertical target was 43,1%, in the horizontal 52,9%. The frequency of movements increased by 12,2%. The increase in the result of a simple reaction to sound was 20,9%, to the visual signal 19,4%, a complex reaction with a choice of 21,7%.

The increase in high-speed power abilities amounted to 11,5%. The level of agility increased by 3,1%.

The application of a comprehensive program in the eighth-grade pupils has a lot of effective impact on their development of coordination abilities, as evidenced by the absence of statistical changes at the end of the research is showing the level of development of coordination abilities  $p > 0,05$ .

### Discussion

The introduction of special exercises for orientation in space occurs with a close relationship between the pupil and the teacher. Taking into account the initial training and physical state of the pupils should be guided by the desire and interest to participate in training [12,23].

Literary data on the effectiveness of using physical education means to improve the motor fitness of pupils with special needs, which is one of the factors for their social adaptation, were confirmed (Yu. A. Briskin, 2003; V. D. Polishchuk, 2006; S.P. Yevseiev, 2012, etc.); a small number of pupils with disabilities involved in independent physical exercises (A. V. Mahliovanyi, A. N. Stasiuk, 2013); the presence of reliable differences between boys and girls with intellectual disabilities in some indicators of motor fitness (Yu. P. Ilyin, 2011; A.P. Romanchuk, A.V. Huziyi, M.N. Hlushchenko, 2016); attitudes of students with disabilities towards physical education lessons: Reasons for their indifference and preference for leisure time activities (Kurkova P., &

Nemcek D., 2016); modern health technologies used in the process of adaptive physical education of schoolchildren Richok, T. (2017) [14,21,22].

Results of researches of related industries are collectible pedagogy and adaptive physical education (T. M. Osadchenko, A. A. Semenov, V. T. Tkachenko, 2014; Lee, O, Yoon, K., Choi, E., Son, H., Jung, H., Lee, K. (2018); G. Yu. Kurtova, A. A. Arkhipov, M. Yu. Korop, V. G. Hamov, A. V. Vertel, 2017 and others), cannot be mechanically transferred to the process of training persons with a deviation in mental development [13,16,20]. Analyzing the results, it can be noted that the exercises formed by the complex for pupils with special needs at the initial stage of training sessions affected the indicators of development of speed abilities, jumping, dexterity, as evidenced by a reliable improvement in the results of the tapping test, reaction speed, standing jump, shuttle run 4x9m.

Methods for improving training programs, limiting the number of training tasks during eight weeks of preparation are proved. However, the track and field athletics training program for sportsmen with mental disabilities has several drawbacks, namely: individual determination of physical activity for each pupil isn't taken into account, the variable components of training sessions aren't investigated, which depend on the readiness of pupils and the degree of deviation of mental development.

The compiled set of special exercises showed effectiveness in the training process but doesn't take into account the development of other physical qualities, namely flexibility and strength, requiring a person with intellectual disabilities. The results obtained are relatively new compared to literature data [17,20]. Our research also showed a positive effect on attitudes towards learning and requires ongoing monitoring, which is also new literature data [21].

In our opinion, the reasons for restraining pupils with psychophysical disorders in mastering motor skills are as follows:

- 1) rapid fatigue;
- 2) disorders of the motor sphere, which are caused by damage to the central nervous system (with delayed mental development, broadcast deficiencies);
- 3) sensory (in case of hearing, vision disorders) and physical (in case of musculoskeletal disorders) disorders;
- 4) lack of motives, insufficient competitive practice;
- 5) insufficient material and technical support affects the efficiency of using a modern sports base.

Pupils with psychophysical disorders need regular thorough examination and supervision of doctors to make adjustments to training sessions.

The results of the research prove the effectiveness of introducing special exercises into the educational process that increases the level of mastery of simple movements and interest in the sports section.

The scientific researches of Briskin Yu. A. regarding the structure and content of the training program of the Special Olympics in track and field athletics was introduced in the experiment as a stage of preparing athletes for competitions and focused on training sessions, taking into account the degree of readiness of pupils with special needs [22].

The data of the experiment on the analysis shows that the strategy was chosen correctly: the experimental groups in the test results improved the sports indicators of coordination abilities.

According to the results of the research, it can be argued that the special formed exercises are aimed at improving motor fitness and indicators of spatial orientation and contribute to increasing the level of sports fitness.

## Conclusions

1. The introduction in the training process of the application of special exercises for teaching pupils with mental retardation, taking into account the individual features of psychophysical development, creates optimal conditions for improving motor fitness and indicators of spatial orientation.

2. Complexes of general-developing exercises, special running exercises, flexibility and relaxation, exercises and ball games for motor fitness, and spatial orientation of pupils with physical and mental disabilities are used in the preparatory part of the lesson to prepare the musculoskeletal system for physical activity.

3. It is important for physical culture teachers, as well as coaches, to have a wide arsenal of exercises, to master their terminology, technique and skills to make complexes for various classes.

The developed program influenced most effectively the development of coordination abilities of the 4<sup>th</sup>-grade pupils  $p < 0,05-0,001$ . The program was developed for the same effective action for both girls and boys and had such indicators of coordination abilities as accuracy, reaction speed. The boys had a better program to increase the dexterity  $p < 0,05$ , and the girls to increase the frequency of movements  $p < 0,05$ .

Despite the tendency to improve the level of development of coordination abilities in the 8<sup>th</sup>-grade pupils, after the application of the developed program, significant changes in the level of development of coordination abilities weren't observed  $p > 0,05$  in the 8<sup>th</sup>-grade pupils.

So, the results of the researches indicate the effectiveness of the proposed program among pupils with mental disabilities studying in the fourth grade of the Communal Institution "Bohodukhiv Special Educational Complex" of the Kharkiv Regional Council.

Using the right choice of pupils with mental retardation creates conditions for improving sports performance in speed and dexterity. The provided recommendations to physical culture teachers allow conducting training sessions taking into account the individual characteristics of the psychophysical development of pupils with special needs.

Further researches are planned to focus on developing the methods for mastering special exercises aimed at flexibility and strength.

#### Conflict of interests

The authors declare that there is no conflict of interests.

#### References

1. Avrutin, S. Ju. Artjushenko, A.F. Betsa N.N. (2017). Legkaja atletika : K.: Logos, 759 s. (in Ukrainian)
2. Akdemir D, Çak T, Aslan C, Aydos BS, Nalbant K, Çuhadaroğlu-Çetin F. (2016). Predictors of self-esteem in adolescents with a psychiatric referral. *Turk J Pediatr* 2016;58:69-78.
3. Bodnar IR, Stefanyshyn MV, Petryshyn YU.V. (2016). Otsynuyvannya rivnya fizychnoyi pidhotovlenosti uchniv starshykh klasiv z urakhuvannyam pokaznykiv fizychnoho rozvytku [Assessment of the level of physical preparedness of students of senior classes taking into account the indicators of physical development] *Pedahohika, psykhohihiya ta medyko-biologichni problemy fizychnoho vykhovannya i sportu*. – 2016;6:9–18. (in Ukrainian)
4. Briskin Iy, Perederii A, Pitn M. (2017). Metodichne zabezpechennia sistemi pidgotvoki sportsmeniv Spetsialnih Olimpiad [Methodical maintenance of the system of training of athletes of Special Olympiads] *Ykraiñsku jyrnal meditsini, biologii ta sporty*. – 2017;1(3):200–208. (in Ukrainian)
5. Chebotar'ova OV, Blech HO, Hladchenko IV, Trykoz SV, Bobrenko IV. (2016). Kryteriyi otsynuyvannya navchal'nykh dosyahnenn' uchniv pochatkovykh klasiv z porushennyamy rozumovoho rozvytku [Criteria for assessing the educational achievements of elementary school students with intellectual disabilities] *K., ISP NAPN Ukrayiny*, 2016;81. (in Ukrainian)
6. Choi, E., Park, J.-J., Jo, K., & Lee, O. (2015). The influence of a sports mentoring program on children's life skills development. *Journal of Physical Education and Sport*, 15(2), 264.
7. Gejchenko L. M. (2018) Ispol'zovanie spetsial'no-podgotovitel'nyh uprazhnenij v razvitii skorostnykh kachestv sprintera. *Vesnik MDU im. A. A. Kuljashova*. 1(51). pp. 91 – 96. (in Ukrainian)
8. Glazkova, G., Mamonva, O., Gracheva, D., & Pukhovskava, M. (2020). Social aspects of physical education of students with deviations in health status. *Journal of Physical Education and Sport, Vol.20 (5)*, Art 347, pp. 2545 – 2553.
9. Gujar, N. M., & Ali, A. (2019). Effects of psychological capital and self-esteem on emotional and behavioral problems among adolescents. *Journal of Mental Health and Human Behaviour*, 24(2), 85.
10. Kashuba, B., Futorny, S., Andrieieva, O., Goncharova, N., Carp, I., Bondar, O., Nosova, N. (2018) Optimization of the processes of adaptation to the conditions of study at school as a component of health forming activities of primary school-age children. *Journal of Physical Education and Sport*, 18(4), pp. 2240 – 2247.
11. Klymovych, V., Olkhovyi, O., & Romanchuk, S. (2016). Adoption of youth's bodies to educational conditions in higher educational institutions. *Journal of Physical Education and Sport*, 3(1), 620–622.
12. Kim, Y. K. (2018). The Relationship among Estimated Intensity of Physical Activity, Stress Response and Positive Psychological Capital. *Journal of Digital Convergence*, 16(11), 581-588.
13. Kurtova, G. Yu., Arhipov, O. A., Korop, M. Yu., Gamov, V. G., & Vertel, O. V. (2017). Vznachennya vidnoshennya majbutnih uchiteliv fizychnoyi kulturi do profesijnoyi diyalnosti v inklyuzivnomu klasi. [Determining the attitude of future physical education teachers to professional activities in an inclusive classroom]. *Visn. Chernigivskogo nacionalnogo pedagogichnogo universitetu imeni T.G. Shevchenka*. Vip. 147. Tom I. Seriya: Ped. nauki. – Chernigiv: *ChNPU*; 312 – 315. (in Ukrainian)
14. Kurkova P., & Nemcek D. (2016). Attitudes of students with disabilities towards physical education lessons: Reasons for their indifference and preference for leisure time activities. *Journal of Physical Education and Sport*, 16(1), Art 35, pp. 222 – 229, DOI:10.7752/jpes.2016.01035.
15. Labrador-Roca, V., Vázquez, J., Yuba, E. (2020). The effects of educational intervention on the behaviour of students with ADHD. *Journal of Physical Education and Sport*, 20(5), pp. 2595-2606.
16. Lee, O, Yoon, K., Choi, E., Son, H., Jung, H., Lee, K. (2018). How is positive youth development understood and practiced by Korean secondary physical education teachers? A broad picture *Journal of Physical Education and Sport*, 18(4), 337.
17. Malm, C., Jakobsson, J., & Isaksson, A. (2019). Physical Activity and Sports—Real Health Benefits: A Review with Insight into the Public Health of Sweden. *Sports*, 7(5), 127.
18. Mulyk, K.V., Mulyk, V.V. (2016). Influence of various types of physical education and health classes on the level of health of student youth. *Pedahohichni nauky. Fizychno vykhovannya ta sport*; 139(2), 118-121.

19. Pavlenko, T., Pavlenko, E., Tamozhanska, A & Anastasija, N. (2019). Special Running Exercises in Track and Field Athletics Training Program for Pupils with Special Needs. *International Journal of Applied Exercise Physiology*, 8(3), 72-83.
20. Prystupa Y, Perederiy A, Briskin Y, Pityn M. (2015). Organizational basics implementation of the programs of Special Olympics Harvard Journal of Fundamental and Applied Studies. – 2015;1(7):266–272.
21. Richok, T. (2017). Modern health technologies used in the process of adaptive physical education of schoolchildren. Kyiv: *Naukovij chasopis [Nacionalnogo pedagogichnogo universitetu imeni M. P. Dragomanova]*. Vol.(3), pp. 85–90.
22. Romanchuk, A.P., Guzi, O.V., & Glushenko, M.N. (2016). Gendernye osobennosti sensomotornoj funkcii u molodyh lyudej s dvigatelnoj asimmetriej. [Gender features of sensorimotor function in young people with motor asymmetry] *Zhurnal obrazovaniya, zdorovya i sporta*; 6 (1): 38-63. (in Ukrainian).
23. Troyanovska, M. M. (2018). Adaptivna fizichna kultura [Adaptive physical education]: navch.-metod. posib. dlya studentiv fakultetiv fizichnogo vihovannya; *Nacionalnij universitet «Chernigivskij kolegium» imeni T. G. Shevchenka*. Chernigiv;104. (in Ukrainian).
24. Ts'os' A, Hats H. (2016). Pedagogichna diahnostyka v protsesi navchannya fizychnoy kul'tury uchniv zahal'noosvitnikh navchal'nykh zakladiv [Pedagogical diagnostics in the process of teaching physical education of students of general educational institutions] *Physical Education, Sports and Health Culture in Modern Society*, 2016;4(20):201–209. (in Ukrainian)
25. Yilmaz, A., Kirimoglu, H., & Mirze, F. (2020). Examining the Sports Participation Motivation Levels of Physically Disabled and Hearing Impaired Athletes. *International Journal of Applied Exercise Physiology*, 9(3), 55-65. (in Turkey)