







RESEARCH ARTICLE

## The Effect of Extracurricular Education on the Motor Activity of School Children

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### Abstract

Developing the population's physical activity (especially children and adolescents) is an integral part of the international strategy "Health for all in the XXI century". The purpose of our research is aimed at the development of children's motor activity, which is an integral part of the nation's health. Methods. 28 students aged 8-12 took part in the study (14 children who were engaged in go-karting - boys - 10 people and 4 girls and 14 children who were engaged in beadwork - of them 2 boys and 12 girls). The level of physical condition was assessed with the help of G. L. Apanasenko's express-diagnosis system, and the cognitive sphere of children (memory, attention, thinking) was studied according to L. Vygotskyi. Statistical methods were used for data processing and verification in the Statistica 6.0 program. During the research, it was established that in practice (karting and bead weaving) both mechanisms (educational/developmental and physical activity) are involved. In other words, moderate or high physical activity involving complex movements or rules will positively affect cognitive development. Conclusion. We found that children are influenced not only by sports but also by clubs that are part of the activities of extracurricular education institutions.

### Keywords

Physical Activity, School, Sports, Beadwork, Karting

## INTRODUCTION

The formation of humanity at all stages of its evolutionary development took place in an inseparable connection with active motor activity. The human body develops in constant motion. Nature itself has decided that human beings need to develop their physical abilities. The child is not yet born, and his future physical and mental development is already interrelated with physical activity (Bohnert et al., 2010). The need for movement, and physical activity is a characteristic feature of the growing organism. Unfortunately, an adult needs much less movement than a child. But

movement is necessary, like food and sleep. The body takes a lack of food and sleep, causing a few aggravating sensations.

The development of the population's physical activity (especially children and adolescents) is integral to the international strategy "Health for All in the XXI century". Moreover, in the context of the COVID-19 pandemic (Apanasenko & Volhina, 2000) due to the significant congestion of medical infrastructure in each country, the government's policy of preventing premature death based on lifestyle modifications is the driving force of health.

Motor insufficiency goes completely unnoticed and is often accompanied by a sense of

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comfort. A lack of physical activity reduces the body's resistance to colds and the action of pathogenic microorganisms. People who lead a sedentary lifestyle, and are not engaged in physical culture, are more likely to suffer from respiratory and circulatory diseases. The impact of exercise on the human body is extremely large.

At the same time, excessive use of modern information technologies, reduction of motor activity of schoolchildren, destruction of the value of consciousness, and age-related functional changes in the activity of various body systems, especially children, have led to the deterioration of children's health (Metsäpelto & Pulkkinen, 2012). That is why the problem of forming a healthy lifestyle for school children is relevant.

Numerous scientific studies have shown (Blomfield & Barber, 2009) that physical activity significantly contributes to a healthy lifestyle, and in some cases reduces the negative impact on the human body of bad habits, increases stress resistance and distracts from antisocial behavior. Physical activity is a generating and stimulating factor in the system of a healthy lifestyle and is important for improving the physical development and fitness of the person, and prevention of various diseases, including infectious ones. The National Strategy for Physical Activity in Ukraine until 2025 "Physical Activity - Healthy Lifestyle - Healthy Nation" after analyzing the results of world experience (10 March 2020 - Covid-19) and the current state of development of the domestic system of physical fitness that determines the purpose and main objectives aimed at creating conditions for increasing the level of involvement of the population (especially children and adolescents) in health-improving physical activity.

It is important to choose the right physical activity for each child. Not every child is a born athlete or even particularly interested in sports (Lutsenko et al., 2020). Children should be able to learn the exercises that interest them. That is why the system of extracurricular education has many advantages, because not all extracurricular activities are physical, but are also aimed at developing the creative potential of the child.

All over the world, the out-of-school education system in Ukraine is an integral part of the lives of children and young people. Extracurricular education is an integral part of the education system defined by the Constitution of Ukraine, the laws of Ukraine "On Education", "On

Extracurricular Education" (Kurok, Lucenko, et al., 2020), and aims to develop the abilities of children and youth in education, science, culture, physical education culture and sports, technical and other creativity, their acquisition of primary professional knowledge, skills, and abilities necessary for their socialization, further self-realization and/or professional activities.

Today there are several types of out-of-school education institutions in Ukraine, including out-of-school education institutions that can operate in the form of centers, complexes, palaces, houses, clubs, stations, rooms, studios, art schools, small academies of arts (folk crafts), small academies of sciences, art schools, sports schools, children's and youth sports schools of the Olympic reserve, physical culture and sports clubs at the place of residence, physical culture and health clubs for children with disabilities, specialized children's and youth sports schools of the Olympic reserve, children's stadiums, children's libraries, galleries, bureaus, health facilities that provide extracurricular education (Burgess, 2013).

A wide variety of extracurricular activities allows children to find their passions and talents. This can help children feel better. One of the most well-known benefits of extracurricular activities is improving self-esteem. Demonstrating a breadth of interest or commitment to a particular discipline, extracurricular programs can also help older children succeed when it comes to college or the job market.

Extracurricular activities should also be preferred for improving mental health. Both self-esteem and a sense of belonging contribute to the more general benefits associated with mental and psychosocial health. One study (Metsäpelto, & Pulkkinen, 2012) found that adolescents who participated in extracurricular activities showed higher levels of life satisfaction and optimism, as well as lower levels of anxiety and depressive symptoms. However, it has not been studied enough whether there is an improvement in children's cognitive abilities in extracurricular activities or how it is related to motivating children to physical activity.

Therefore, our article aimed to establish the patterns of motivation of children to physical activity using out-of-school education centers. If school education provides the necessary scientific knowledge, then extracurricular education contributes to the diverse development and

formation of personality (Metsäpelto & Pulkkinen, 2012). By attending institutions that specialize in extracurricular education, your child will have the opportunity to discover new talents or develop existing skills. Teachers who work in such institutions try to maximize the creative potential of everyone who is enrolled in a club or studio.

Today, extracurricular education offers a wide choice and allows you to choose sections, studios, and classes that will not only promote the development of the child but also bring him joy. It can be both sports and creative. By attending a studio of applied arts or a drawing class, the child will develop artistic taste, learn to understand art, and be able to please their parents and loved ones with interesting works. Sports sections are also very popular - the physical development of the child is extremely important. Oriental martial arts or football, gymnastics, or swimming - the choice of the section only depends on the child's inclinations and level of physical fitness.

Visiting out-of-school education institutions takes place during leisure time in the educational institution. Extracurricular sections can operate directly on a school basis or work in local clubs, creative centers, palaces of children and youth, and other institutions of this type. Today, the out-of-school system in Ukraine is represented by state, municipal, and private educational institutions. This allows you to choose both free cultural, educational, and sports facilities, as well as those where parents must pay a certain amount for their children's education (Lucenko et al., 2023). Extracurricular education helps to organize interesting leisure for kids and unleash their creative potential! It is known that the optimal level of physical activity for children is the optimal level of health. Under quarantine, fitness is essential for the prevention of physical and mental health problems.

A sedentary lifestyle leads to health problems (Bohnert, Fredricks & Randall, 2010). Our research has shown that the probability of developing diseases increases by 20% at low levels of motor activity. The probability of multiple pathologies (more than 3 diseases) increases in children and adolescents almost 4 times with low levels of physical activity, and the probability of neurosis - is 2.5 times. Children who have screen time of more than 2 hours a day are also at risk for deteriorating health. According to our data, there are 65.8% of such children. This increases the likelihood of a 45% reduction in performance.

Girls are 2.5 times more likely to lead a sedentary lifestyle than boys.

Therefore, it is necessary to help children remain physically active both in everyday life and in such special periods as quarantine.

Extracurricular activities are additional classes that are not included in the curriculum of the educational institution, they are additional and should be fixed by the relevant regulations recommended by the Ministry of Education and Science of Ukraine. When it comes to education, extracurricular activities can improve daily subject areas or individual interests. These activities may include sports, dance, theater, craftsmanship, speech/debate, or cooking. Under the usual situation before COVID-19, all extracurricular activities for children took place in the school environment without many restrictions, especially protocols related to health safety.

Challenges posed by COVID-19. The presence of COVID-19 has created enormous challenges for all forms of learning (10 March 2020 - Covid-19) (school, extracurricular), as well as many obstacles to the ability to form comprehensive children. Of course, the teachers had a huge task to teach through the screen (Lucenko et al., 2023).

The days before the electronic device were long for both the teacher and the children, with no switching or extracurricular activities to relieve the stress and anxiety created by this new classroom environment. Virtual training during isolation in most regions has forced schools to cancel all sports that took place at school. All sports grounds were closed, all premises, such as theaters or libraries, were closed, and any activity involving children more than 1.5 meters apart was prohibited.

Advantages of extracurricular activities. Extracurricular activities offer all children the opportunity to succeed in a field that is not directly related to learning activities. These activities can increase a child's confidence and reduce any anxious feelings caused by possible academic demands. Out-of-school activities also allow children to have much-needed unstructured socialization. Many children make friends with peers.

Children from different schools in the district gather to participate in extracurricular activities, and these opportunities provide an exchange of views in a particular field of activity. Many

extracurricular activities give children the opportunity to develop a sense of leadership as activities can involve growth with equalization of challenges to advance in it. Developing and increasing children's confidence is another advantage of extracurricular education. Socio-emotional connections through interaction with peers and/or coaches or instructors shape and improve the children's personality, problem-solving ability, opinion, advocacy, and decision-making skills.

Extracurricular activities for school-age children bring great benefits to the development of a full-fledged child; the absence of these measures, even temporarily, can cause side effects on children's development. Now as most children are familiar with virtual meeting platforms, opportunities for children to pursue a speech/debate program or multi-level learning programs such as art, karate, or dance lessons can be streamed across the screen. Many meeting applications have group facilities that allow teachers to meet with small groups or individual children and provide one-on-one instruction (Giuffrida et al., 2023).

Schools can also hold extracurricular family activities for the school community through virtual meetings, such as a game night, a large-scale skill, or a children's talent night that brings the school community together with fun and socializing. These extracurricular activities are probably the safest ones when you need to limit or eliminate contact with others. Extracurricular activities are necessary, expected, and valuable for children of all ages. Children need the opportunity to succeed outside the classroom or try to engage in activities that pique their interests, and then ignite a passion for the future that can inspire a career.

Purpose - developing children's motor activity is an integral part of the nation's health.

## MATERIALS AND METHODS

### Participants

The study was conducted in compliance with the basic bioethical provisions of the Council of Europe Convention on Human Rights and Biomedicine (from April 4, 1997), the Helsinki Declaration of the World Medical Association on Ethical Principles of Scientific Medical Research with Human Participation (1994-2008), as well as the order of the Ministry of Health of Ukraine No. 690 dated September 23, 2009.

The study was approved and supervised by the Ethics Committee Oleksandr Dovzhenko Hlukhiv National Pedagogical University (Ref: 20/24), dated 25 May 2024)

For 3 months (August, September-October 2023) the objects of pedagogical observations were children aged 8-12. 28 children were examined (14 children who attended karting classes - boys - 10 people and 4 girls and 14 children who attended beadwork - including 2 boys and 12 girls) (Table 1).

In the study group of children, we studied the level of physical health and features of the cognitive sphere. Karting classes were held 3 days a week - Tuesday, Friday, and Saturday (for practical application of knowledge and measurement of children's physical indicators, a trip to the autodrome is mandatory). Beading classes were also held during the week, but on other days - Monday, Wednesday, and Friday. Those children who were engaged in two groups at the same time - go-karting and bead weaving, combined their activities. The duration of such studies was three months (12 weeks) (Table 2). The duration of one lesson is 3 hours per day. We started our research with the first lesson according to the schedule - Tuesday, August 12, 2023.

**Table 1.** Demographic data of participants

Data	Group	Values				p
		Minimum	Maximum	Mean	±Sd	
Age (years)	Beadwork	8	12	9,71	1,39	0,5
	Karting	8	12	9,71	1,33	
Height (sm)	Beadwork	126	157	139,29	8,34	0,22
	Karting	126	158	140,43	8,35	
Weight (kg)	Beadwork	28	51	42,39	6,89	0,39
	Karting	28	53	41,89	7,34	



**Table 2.** A 12-week program of student research with a description of the methodology and duration

Week	Beading	Karting
1 week	1 class, duration 2 hours (Determining the level of physical condition of the body according to the method of G.L. Apanasenko - data collection by anthropometry, measurement of blood pressure, heart rate, hand muscle strength, vital capacity of the lungs and determination of the level of memory, attention and thinking according to the method of L. Vygotsky - test form)	1 class, duration 2 hours (Determining the level of physical condition of the body according to the method of G.L. Apanasenko - data collection by anthropometry, measurement of blood pressure, heart rate, hand muscle strength, vital capacity of the lungs and determination of the level of memory, attention and thinking according to the method of L. Vygotsky - test form)
	2 class, duration 2 hours (Determining the level of physical condition of the body according to the method of G.L. Apanasenko - data collection by anthropometry, measurement of blood pressure, heart rate, hand muscle strength, vital capacity of the lungs and determination of the level of memory, attention and thinking according to the method of L. Vygotsky - test form)	2 class, duration 2 hours (Determining the level of physical condition of the body according to the method of G.L. Apanasenko - data collection by anthropometry, measurement of blood pressure, heart rate, hand muscle strength, vital capacity of the lungs and determination of the level of memory, attention and thinking according to the method of L. Vygotsky - test form)
	3 class, duration 2 hours (Determining the level of physical condition of the body according to the method of G.L. Apanasenko - data collection by anthropometry, measurement of blood pressure, heart rate, hand muscle strength, vital capacity of the lungs and determination of the level of memory, attention and thinking according to the method of L. Vygotsky - test form)	3 class, duration 2 hours (Determining the level of physical condition of the body according to the method of G.L. Apanasenko - data collection by anthropometry, measurement of blood pressure, heart rate, hand muscle strength, vital capacity of the lungs and determination of the level of memory, attention and thinking according to the method of L. Vygotsky - test form)
2-12 week *	1 class	1 class
	2 class	2 class
	3 class	3 class

\*Note – the corresponding data presented in the table were repeated every session during the 12 weeks of the study.

These groups of children studied in completely different physical and orientation extracurricular activities. Namely, karting is a kind of motorsport in which cards are used - small racing cars with open wheels. Maps can develop speeds from 24 km/h (amateur models) to 260 km/h (sports supercars). Karting is often seen as an initial step in preparing for more expensive and prestigious motorsports and beadwork - involves children mastering the basic knowledge of beadwork, the development of creative abilities of children, and the formation of their lasting interest in classes in arts and crafts clubs. Children learn to string beads in different ways, to make toys, jewelry, and paintings.

#### **Data Collection Techniques**

The level of physical condition corresponds to a certain level of physical health, which can be assessed using the diagnostic express system (Apanasenko & Volhina, 2000), which includes a set of anthropometric and functional indicators.

Express assessment (the main anthropometric indicators (body length and weight) are registered, as well as some functional ones - heart rate, systolic blood pressure, lung vital capacity, and hand muscle strength. Based on the obtained data, indices are calculated: body mass index, vital index, strength index, Robinson index. The results obtained during the initial examination are compared with tabular data with the assignment of a certain number of conditional points for each of the indicators registered for this recipient) of the level of physical health of recipients according to H.L. Apanasenko was developed in two versions: for school-age children and representatives of the adult contingent of the population.

The obtained measurement data was carried out in a specially designated room, we entered it into the author's research protocol, with which the parents were familiarized and consent was given by all the requirements of the law on bioethics. The research protocol contained the following information: age, gender, and anthropometric data - height, and

weight. Dynamometry (Dynamometry is a method of measuring the force of contraction of various muscle groups. There are different types of dynamometers for dynamometry. The most common spring dynamometer. The subject squeezes it with the brush of an outstretched hand. The compression force is indicated by an arrow on a special scale.) and Robinson's index were studied according to the formulas presented below. We calculated all this information in the Statistics 6.0 program. (statistics section). According to Apanasenko's method, the results of the study were translated into the corresponding points, presented graphically in the section.

When determining the level of physical health according to H.L. Apanasenko in adults, the main anthropometric indicators (body length and weight) are recorded, as well as some functional ones - heart rate, systolic blood pressure, the vital capacity of the lungs (VCL, ml), and the strength of the muscles of the hand (Apanasenko & Volhina, 2000) Based on the obtained data, the indices are calculated:

$$\text{Body mass index} = \frac{\text{body weight, kg}}{(\text{height, m})^2}$$

$$\text{Vital index} = \frac{\text{VCL, ml}}{\text{body weight, kg}}$$

$$\text{Strength index} = \frac{\text{hand strength, kg}}{\text{body weight, kg}} \times 100 \%$$

$$\text{Robinson's index} = \frac{(\text{heart rate, bpm}) \times (\text{SBP})}{\text{body weight, kg}}$$

Then a standard Martin-Kushelevsky functional test is performed and the recovery time after 20 squats in 30 seconds is recorded. The results obtained during the initial examination are compared with tabular data (separately for women and men), based on which a certain number of points are calculated for the real value of each specified parameter. The assessment of the integral indicator - the level of physical health (LPH, points) is carried out considering the total number of points obtained and the gradation of LPH into the following functional classes: "low", "below average", "average", "above average", "high" (Apanasenko & Volhina, 2000)

When registering the level of physical health of school-age children according to G.L. Apanasenko's method, the same functional

indicators are registered, only the ratio of body mass and length is calculated according to special tables, and instead of the heart rate recovery time after 20 squats in 30 seconds, the index of their physical performance is calculated according to the Ruffier formula Dixon. The results obtained during the initial examination are compared with tabular data with the assignment of a certain number of conditional points for each of the indicators registered for this recipient. The assessment of the integral indicator - the level of physical health LPH is carried out considering the total number of points obtained and the gradation of LPH into the following functional classes: "low", "below average", "average", "above average", "high". The study of cognitive areas in children, namely, studied the features of memory, attention, and thinking using the following techniques. Research of thinking with the help of Raven's progressive matrix tests, attention with the help of Proofreading (B. Bourdon), and memory according to the method of L. Vygotsky. It should be noted that at the time of the study, all children were completely healthy, and had a good mood while attending their group classes. Parents, in turn, were informed (by letter of agreement) about the appropriate data collection from their children and their further processing (a reference to the convention).

The study was conducted in compliance with the basic bioethical provisions of the Council of Europe Convention on Human Rights and Biomedicine (of April 4. 1997), Helsinki declaration of the World medical association on ethical principles of conducting scientific medical investigations with participation of humans (1994-2008), and the Order of the Ministry of Health Protection of Ukraine № 690 of September 23. 2009.

### **Statistical Processing**

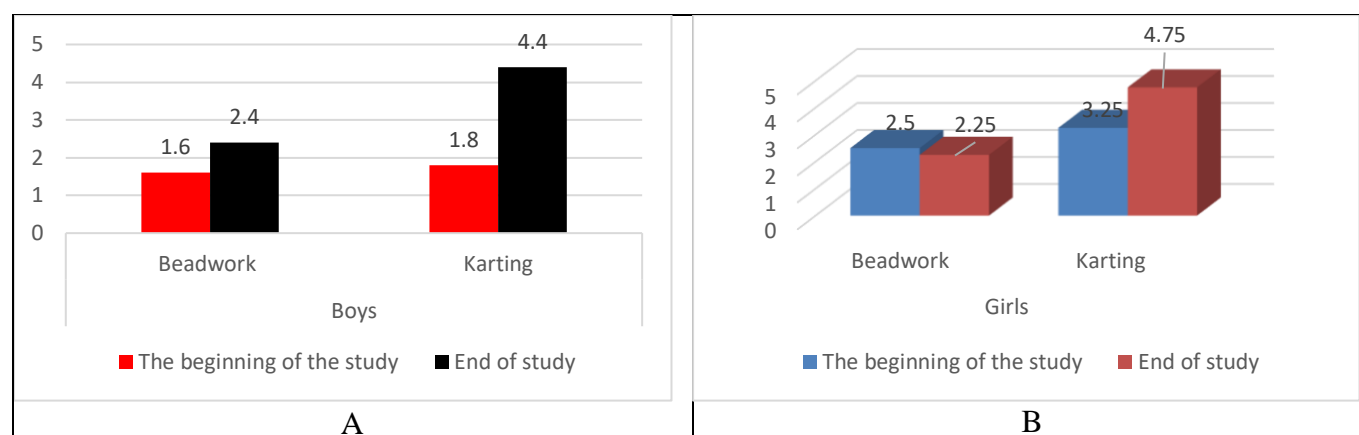
The data were processed by generally accepted statistical methods using the personal computer and the program Statistica 6.0. As the evaluation of each surveyed was based on the points scale we used later not the arithmetic average of the points scored, but the median. For comparison non-parametric methods of analysis were used, in particular the Wilcoxon test.

## **RESULTS**

It may seem that school is a great environment for the development and support of children's

physical activity because that's where the lion's share of a child's life takes place. However, many schools refuse this opportunity. And this is not surprising: schools are required to improve constantly the academic achievements of children. As a result, many educators - and parents, by the way - believe that reading, writing, or math should always be given higher priority than physical education. Therefore, most parents with priority no less than children give priority to a variety of classes in out-of-school education.

Based on this, we decided to explore - how completely diverse classes (karting and beadwork) affect the physical development of school children.



**Figure 1.** Indicators of the level of physical health of children engaged in beadwork and karting at the beginning and end of the study

The change in the level of physical health of girls in the karting group and the beadwork group is shown in Fig. 1b. At the beginning of the study, girls in both groups had a low level of physical health and averaged 2,50 points in the beadwork group. karting – 2,25 points. At the end of the study, the physical health of girls in both groups increased but remained below average.

The difference in physical health at the end of the karting girls' study was higher at 1,5 points. Thus, the rapid assessment of the level of physical health of boys and girls by G.L. Apanasenko proved that karting has a more effective effect on the level of physical health, which indicates a better adaptation of body systems to physical activity. However, it should be noted that children engaged in beadwork also had positive changes in their physical performance in contrast to the initial level of their values. Beadwork considers manual labor, which triggers muscle work, circulatory mechanisms, etc. Therefore, it cannot be said that

Comparing the level of physical health of children involved in go-karting and beadwork at the beginning of the study, the level of physical health of boys in both groups was low and according to a rapid assessment of the level of physical health by G.L. Apanasenko (2004) scored 1,6 points in the beadwork group and 1,8 points in the karting group. At the end of the study, the level of physical health in karting groups increased and reached a level below average (4,4 points). In the beadwork group, the level of physical health increased (2,4 points) but remained low (Fig. 1a).

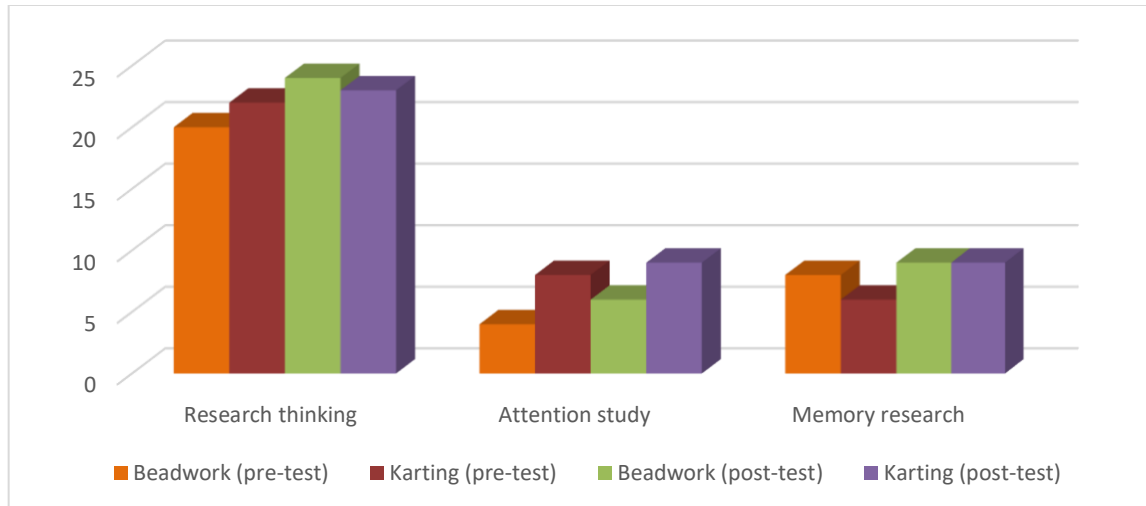
activities that are not physically active hurt the physical health of children.

We were also interested in whether there is a direct relationship between the impact of physical activity on children's cognition during various classes. There is convincing evidence of the positive effects of exercise on the cognitive development of the child (Din, 2006). More physically active children generally do better in school: this is reflected in their math, writing, and reading results. Increasing physical activity is associated with improving academic achievement and strengthening connections between areas of the brain, as well as increasing the effective activation of areas of the brain involved in cognitive activity.

Interestingly, the strongest link between the physical and cognitive spheres is in the development of executive functions. Executive functions are a term that combines a set of high-level cognitive processes that allow you to control your behavior and plan actions according to the goal, change reactions depending on the conditions

and context of a situation, pay attention to certain incentives, store information, focus on a specific task, and slow down automatic responses. Executive functions are a very important moment for learning. So, logic tells us that - because the level of physical activity directly affects the executive functions, and executive functions are a necessary condition for academic success - the level

of development of these functions in more physically active children will be higher. Consequently, the academic achievements of more active children will be higher. Therefore, using the techniques described above, we decided to explore the features of attention, memory, and thinking (Fig. 2).



**Figure 2.** Features of attention, thinking, and memory under the influence of physical activity in children engaged in karting and beadwork.

So how does physical activity relate to cognitive activity?

We understand several mechanisms to explain this connection. The first of them is physiological. According to him, moderate and high physical activity (karting) - causes general

physiological changes in the body and specific phenomena in the brain. Physical activity increases blood flow to the brain, leading to structural and functional changes in the long run. For example, increasing the volume of the brain or strengthening the connections between areas of the brain that are often activated together (Fig. 3).



**Figure 3.** Representatives of the karting club at winter pieces of training



The educational (developmental) approach (beadwork) emphasizes the fact that physical activity itself requires cognitive effort - for example, performing a range of movements with

complex rules (Fig. 4). It is believed that such physical activity activates the same areas of the brain that we need to perform cognitive tasks.



**Figure 4.** In the photo the girl who at the same time goes to the centers of extracurricular education institution on beadwork - we weave necklaces on the special machine (beads) (A) and karting (B)

Thus, these areas have become more "trained", have worked more efficiently, and as a result they allow you to demonstrate greater cognitive abilities. According to the educational approach, qualitative aspects of physical activity (for example, types of activity) determine how strong and durable the impact on a person's cognitive performance will be (Fig. 5).

The results of the research show that in practice both mechanisms are involved. In other words, moderate or high physical activity, which includes complex movements or rules, will have the most positive effect on cognitive development.



**Figure 5.** A boy sews an angel for Mother's Day

## DISCUSSION

As we noted at the beginning of our article, extracurricular education is an integral part of children's lives. It should be noted that the understanding of group work (in particular, the cart-making and bead-weaving that we studied) is characteristic only of extra-curricular education institutions. In Ukrainian schools, there is no such sports or dance club where children would have the opportunity to develop physically. Understanding of extracurricular work is characteristic of subject teachers who have the desire and inspiration to work with gifted children in mathematics, biology, chemistry, etc. All other types of activities that would interest children from a physical and socio-psychological point of view. are in out-of-school education institutions. Therefore, it became interesting for us to investigate the conditions of physical development of children engaged in various types of group work and the specifics of the impact on their physical condition in the conditions of distance education.

To date, both foreign (Bronfenbrenner & Morris, 2006; Shakib, Veliz, Dunbar & Sabo, 2011; Lobman, 2006) and domestic studies (Kurok, Lucenko, et al., 2020; Ramey & Rose-Krasnor, 2012) suggest that children's involvement in

physical activity may be associated with changes in certain brain structures (Burgess, 2013), leading to improved memory function (Forman, Olin, Hoagwood, Crowe & Saka, 2009), (including working memory), memory, as well as cognitive control.

The basic development of motor (mon. gov.ua), cognitive and social skills, which are crucial for further development, occurs in early and middle childhood. Therefore, research on the study of cognitive functions of children at the age of 7-12 years is of particular importance. In childhood, engaging in physical activity, and motor activity is especially important. Lack of physical activity in childhood can lead to limited perception and developmental disorders (10 March 2020). In addition, the period of late childhood is the time when motility develops most dynamically (Council of Accreditation, 2011), as well as cognitive functions (Kaprio, 2006). Executive functions allow you to get involved in the situation by planning a certain action as well as to slow down or delay the reaction.

Exercise and physical activity increase blood circulation, which leads to a better supply of oxygen to the brain (Farb, & Matjasko, 2012; Kurok, Lucenko, et al., 2020) as well as provide the brain with nutrients (Metsäpelto, & Pulkkinen, 2012). Exercise positively affects all systems: motor, cardiovascular, respiratory, hormonal, immune, and nervous. Thus, it stimulates the maturation of motor areas of the brain, which in turn affects motor development and increases the speed of nerve impulses.

Physical activity also stimulates an increase in neurohormonal secretion (Veltz & Shakib, 2013) (substances produced by hypothalamic neurons and transported by blood or cerebrospinal fluid), significantly affecting the excitability of neurons that form synapses. School-age children who spend at least an hour a day exercising show much better cognitive function, and researchers emphasize that despite these undoubted benefits (Lobman, 2005), only about a third of children exercise regularly.

### Conclusions

Based on the literature data and combining them with our study, we came to the following conclusion. It is especially necessary to encourage children to be physically active at the age of 7-12, as the child's cognitive functions increase. We also emphasize that physical activity positively affects

all systems: motor, cardiovascular, respiratory, hormonal, immune, and nervous.

We also emphasize the fact that not only active sports improve general health, but also clubs that are part of the activities of out-of-school educational institutions as well. This is confirmed by our research on karting and beadwork.

It is an indisputable fact that the system of out-of-school education both in Ukraine and abroad, and we emphasize/insist on it, is part of the educational process when a child develops new knowledge, skills, and abilities through sports achievements, creativity, creativity, etc. That is, not only does the school affect the creative potential of children, and the development of certain abilities and skills, but also the extracurricular system makes its adjustments in this process.

Therefore, it is necessary to motivate children to physical activity and extracurricular education helps in this.

### Ethical considerations

The study was approved and supervised by the Ethics Committee Oleksandr Dovzhenko Hlukhiv National Pedagogical University (Ref: 20/24), dated 25 May 2024)

### Conflict of Interest

The authors declare no conflicts of interest.

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### Author Contributions

Study conception and design: GL, OL; Data Collection: OD, VS; Analysis and Interpretation of results: GL, OL; Draft manuscript preparation: OL, OD, VS; All authors reviewed the results and approved the final version of the manuscript.

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