**DOI https://doi.org/10.30525/978-9934-26-522-8-13**

# METHODOLOGY OF FITBOXING CLASSES FOR SENIOR SCHOOL AGE PUPILS IN THE CONDITIONS OF CIRCLE WORK OF GENERAL SECONDARY EDUCATION INSTITUTIONS

**Dubynska O. Ya.**

## INTRODUCTION

Currently, the problem of high school students' health seems to be the most urgent, as the well-being of young families, production potential and the country's defence capability depend on the health of graduates of general secondary education institutions. Only 6-8% of school leavers are recognised as healthy, every second has a morphological and functional pathology, and 42% have chronic diseases [1] [2]. The incidence among high school students has increased by almost 38.4% over the past 15–17 years[3] [4].

According to experts (A. Petrova, T. Bala, 2024; T. Andriushchenko, 2023; I. Masliak, 2017), the reasons for this state of health of the younger generation are economic difficulties, reduced attention to social problems and sanitary culture, weakening of state policy in the field of preventive medicine, and curtailment of scientific research on this issue. A serious cause of health problems is the ever-increasing workload in educational institutions.

The role of systematic physical activity in the development and strengthening of human health resources is recognised by most scientists. An analysis of the current theory and practice of physical education shows that insufficient attention is paid to physical education of high school students. The traditional structure of lessons in secondary schools does not fully

[1] Ажиппо О. Ю., Мамешина М. А. Оцінка функціонального стану кардіореспіраторної системи учнів основної школи. *Актуальні проблеми фізичного виховання різних верств населення*. Харків: ХДАФК, 2019. С. 15–23.

[2] Єланська О. О. Вплив засобів карате на психофізичний та духовно-моральний розвиток підлітків. *Фізичне виховання та спорт*. 2023. № 3. С. 16–22.

[3] Doherty D., Felisky P., Morton K., Sumner K. Functional benefits of fitness boxing for survivors diagnosed with breast or ovarian cancer: a pilot study. *Rehabilitation Oncology*. 2020. P. 154–161.

[4] L. S. Mary, B. Laura, B. Kaitlin, J. Olivia. Effects of Tai Chi, fitness boxing, and video activities on the balance and endurance of a participant with multiple sclerosis: a case study. *Activities Adaptation & Aging*. 2018. Vol. 43(1). P. 1–12. [https://ouci.dntb.gov.ua/en/works/7qobRA1l/].

address the problems of purposeful preparation of students for physical education and physical self-improvement[5] [6].

The organization and content of physical education and sports work at school needs to be critically reviewed. The introduction of new means of physical culture and sport into the process of physical education of senior pupils is one of the promising ways of its improvement[7].

It is physical education lessons at school that should ensure the strengthening of physical and moral health, mental and physical performance of children, adolescents and youth. However, practical experience (Y. Borisova, P. Shkarupilo, 2017; V. Masol, 2020; B. Rybachok, A. Protsenko, H. Sukhanova, 2021) shows that the traditional organisation of physical education in secondary schools is not always interesting for high school students, often does not meet their desires, needs and interests, which is why they do not attend physical education lessons well.

Therefore, the issue of the need to implement new approaches, forms, methods and content of physical education for schoolchildren remains relevant today. At the same time, it is very important to know the main motives and interests of senior pupils in physical culture and sports.

Currently, in the practice of physical education of senior school students in extracurricular activities, a large number of different approaches and technologies are used: sports, health, oriental, fitness technologies, valeological, etc (O. Dubynska, 2023; T. Kravchuk, O. Soroka, 2014; V. Zinchenko, Y. Usachov, 2011).

According to our observations, the most attractive type of sports activity for high school students is fitness training based on various types of martial arts.

This type of physical activity forms motor culture and sports education and contributes to the education of a well-rounded personality. Fitness training allows to increase the level of physical fitness of those who are engaged, working capacity, forms their motivational and value attitudes to regular physical culture and sports activities (O. Yu. Adzhippo, M. A. Mameshina, 2019).

---

[5] Єланська О. О. Вплив засобів карате на психофізичний та духовно-моральний розвиток підлітків. *Фізичне виховання та спорт*. 2023. № 3. С. 16–22.

[6] Рибачок Р. О., Проценко А. А., Суханова Г. П. Актуальність та перспективи розвитку фітнес-боксу в сучасних умовах функціонування системи оздоровчого фітнесу. *Науковий часопис Українського державного університету імені Михайла Драгоманова*. 2021. № 3 (133). С. 105–112.

[7] Присяжнюк С. І. Динаміка показників серцево-судинної та дихальної систем під впливом фізичного навантаження школярів загальноосвітньої школи. *Науковий часопис НПУ імені М. П. Драгоманова*. Київ : Вид-во НПУ імені М. П. Драгоманова, 2020. № 3К (123). С. 345–350.

Taking into account the above mentioned and in connection with the orientation of senior pupils' interests to different types of martial arts, it seemed relevant to eliminate boys' physical inactivity with the help of fitboxing circle classes in the conditions of educational institution.

Purpose: to develop the structure and content of fitboxing training methods for senior school age pupils in the conditions of circle work of general secondary education institutions and to test its effectiveness

Research methods: analysis of scientific and scientific-methodical literature; pedagogical observations; functional tests; pedagogical experiment; testing of physical fitness level, mathematical and statistical processing of numerical indicators.

## 1. The current state of physical education in general secondary education institutions of Ukraine

In the context of war and social tension, Ukraine is facing a challenging task of preserving the health of young people and developing the system of physical education and sport. The country is experiencing a trend towards limited funding for education and physical education, an outflow of professional staff abroad, and a lack of scientifically based developments for the introduction of various physical activities and sports into the education system. The authors' research was conducted during martial law (S. Bilov, V. Tishchenko, 2023).[8]) proves that sport and physical activity can be an effective tool for stabilising the psychological health of citizens and maintaining their physical condition.

Researchers[9] [10] [11], have found a significant deterioration in the health of the Ukrainian population under the influence of aggression. Sports and physical activity can serve as an important means of restoring mental and physical health for people affected by the war. At the same time, there is a problem with providing IDPs with specialized programs and access to sports facilities.

[8] Білов С. О., Тищенко В. О. Сучасний стан і перспективи розвитку плавання в умовах війни та в післявоєнний період. *Фізичне виховання та спорт*. 2023. № 2. С. 39–46.

[9] Андрющенко Т. Організаційно-методичні умови застосування засобів скіпінгу у фізичному вихованні старшокласників. *Спортивний вісник Придніпров'я*. 2023. № 3. С. 3–10.

[10] Білов С. О., Тищенко В. О. Сучасний стан і перспективи розвитку плавання в умовах війни та в післявоєнний період. *Фізичне виховання та спорт*. 2023. № 2. С. 39–46.

[11] Москаленко Н. Створення інноваційної програми розвитку фізкультурно-оздоровчої роботи в ЗОШ. *Спортивний вісник Придніпров'я*. 2005. № 2. С. 37–39.

Physical education is a discipline that provides students with vital skills and abilities necessary for military service, university admission and everyday life. Often, it is of an applied nature and is underestimated both by students who do not want to do 'compulsory exercises in physical education classes' and by school administrators. However, studies show that the most pronounced changes in health, physical development, physical quality and physical fitness occur in high school students – adolescents aged 15–17 years [12] [13].

Thus, physical education, physical fitness and physical development of modern young people as a foundation for further education and life is one of the main issues of our time.

The analysis of scientific and educational literature shows that the originality of physical education of schoolchildren and its methodology is reflected in the works of many well-known teachers and scientists: Y. Usachov et al.[14], M. Dudchak[15], V. Efimova[16], T. Kravchuk[17], I. Masliak[18] and others. The idea of the intrinsic value of school childhood is a red thread in them. According to most scientists, it is during this period that the foundations of the morphological and functional systems of the body are laid, as well as such physical qualities as strength, speed, endurance, flexibility, agility, and positive personal qualities such as diligence, patriotism, morality, etc.

Many modern scientists and pedagogues consider one of the ways to improve physical education of schoolchildren, which is increasingly called

---

[12] Андрющенко Т. Організаційно-методичні умови застосування засобів скіпінгу у фізичному вихованні старшокласників. *Спортивний вісник Придніпров'я*. 2023. № 3. С. 3–10.

[13] Петрова А., Бала Т., Іванова Ю. Вплив вправ кросфіту на показники функціонального стану дихальної системи учнів 16 років. *Актуальні проблеми фізичного виховання різних верств населення*. 2024. С. 47–54.

[14] Зінченко В. Б., Усачов Ю. О. Фітнес-технології у фізичному вихованні: навч. посіб. Київ: НАУ, 2011. 151 с.

[15] Дутчак М., Жданова О., Чеховська Л., Чеховська М. Оздоровчий фітнес як підсистема оздоровчо-рекреаційної рухової активності. *Фізична культура, спорт і здоров'я: стан, проблеми та перспективи*. 2019. С. 134–136.

[16] Єфімова В. М. Здоров'язбережувальні технології у контексті педагогічних досліджень. *Педагогіка, психологія та медико-біологічні проблеми фізичного виховання і спорту*. 2010. № 1. С. 57–60.

[17] Кравчук Т. М., Сорока О. С. Особливості фізичної підготовленості учнів старших класів державних та приватних освітніх закладів. *Теорія та методика фізичного виховання*. 2014. № 2.

[18] Масляк І. П. Вплив аеробіки силової спрямованості на стан кардіореспіраторної системи школярів старших класів. *Науковий часопис НПУ імені М. П. Драгоманова*. Київ, 2017. Вип. 1 (82). С. 35–38.

the consideration of students' sports interests[19] [20] [21] optimal combination of basic and variable components of the curriculum content[22].

Recent studies conducted in European countries confirm the importance of physical activity as a tool for maintaining the psychophysical health of the Ukrainian population. Participation in sporting events and physical activity can help improve the general mental state of the population and reduce stress levels[23] [24] [25].

Today, the deterioration in the health of young people is a global problem for society. The trend towards a decrease in physical activity and, as a result, a deterioration in the health of students is progressing against the backdrop of intensification and modernisation of the educational process in general secondary education institutions. This problem is particularly acute for high school students who, along with an overload of school subjects, are preparing for external independent testing[26] [27] [28].

[19] Зінченко В. Б., Усачов Ю. О. Фітнес-технології у фізичному вихованні: навч. посіб. Київ: НАУ, 2011. 151 с.

[20] Кравчук Т. М., Сорока О. С. Особливості фізичної підготовленості учнів старших класів державних та приватних освітніх закладів. *Теорія та методика фізичного виховання*. 2014. № 2.

[21] Петрова А., Бала Т., Іванова Ю. Вплив вправ кросфіту на показники функціонального стану дихальної системи учнів 16 років. *Актуальні проблеми фізичного виховання різних верств населення*. 2024. С. 47–54.

[22] Коваленко Ю. О., Дорошенко І. Е. Вплив секційних занять із футболу на фізичний розвиток та функціональний стан старшокласників. *Фізичне виховання та спорт*. С. 33–37.

[23] Петрова А., Бала Т., Іванова Ю. Вплив вправ кросфіту на показники функціонального стану дихальної системи учнів 16 років. *Актуальні проблеми фізичного виховання різних верств населення*. 2024. С. 47–54.

[24] Яковенко А. Сучасний стан фізичного виховання школярів у європейських країнах. *Вісник Прикарпатського університету. Серія: Фізична культура*. 2019. № 33. С. 125–132.

[25] L. S. Mary, B. Laura, B. Kaitlin, J. Olivia. Effects of Tai Chi, fitness boxing, and video activities on the balance and endurance of a participant with multiple sclerosis: a case study. *Activities Adaptation & Aging*. 2018. Vol. 43(1). P. 1–12. [https://ouci.dntb.gov.ua/en/works/7qobRA1l/].

[26] Єланська О. О. Вплив засобів карате на психофізичний та духовно-моральний розвиток підлітків. *Фізичне виховання та спорт*. 2023. № 3. С. 16–22.

[27] Томащук О., Деделюк Н., Ковальчук Н., Дем'янчук О., Войтович О. Інноваційні підходи до організації фізичного виховання школярів. *Вісник Прикарпатського університету. Фізична культура*. 2024. Вип. 42. С. 31–35.

[28] Combs S. A., Diehl M. D., Staples W. H., et al. Boxing training for patients with Parkinson disease: a case series. *Physical Therapy*. 2011. Vol. 91. P. 132–142.

The education system has a significant impact on the lifestyle choices and health indicators of the younger generation, given the length of the learning process and the number of young people involved.

According to experts[29] [30][31], the education system is able to influence the positive dynamics in the choice of the way of thinking of students more than other spheres of social life, to promote a healthy lifestyle. A quality education system can only be considered the result of a healthy lifestyle for students if the learning environment provides them with a healthy lifestyle.

The author (S. Prysiazhniuk, 2020) sees the possibility of providing all students with a variety of physical activities during the day in the organisation of optimal physical education classes within the curriculum in secondary education institutions, club classes in extracurricular time, as well as their participation in recreational and health activities organised by various public organisations [32].

The development of physical education and sports initiatives in general secondary education institutions is an important task for engaging young people in physical activity, which will help to maintain a healthy nation and improve the overall level of physical fitness of the population of Ukraine.

Organizing and conducting physical education lessons at the modern scientific and methodological level requires teachers to find innovative ways and methods of implementing the educational process at school[33]. Significant attention should be paid to the introduction of the latest technologies in the educational process of general secondary education institutions, namely new variable modules of the physical education curriculum, which, if used with simple equipment and tools, will help to increase the efficiency of the educational process and motivate students to systematically engage in physical exercise and lead a healthy lifestyle.

---

[29] Білов С. О., Тищенко В. О. Сучасний стан і перспективи розвитку плавання в умовах війни та в післявоєнний період. *Фізичне виховання та спорт*. 2023. № 2. С. 39–46.

[30] Дутчак М., Жданова О., Чеховська Л., Чеховська М. Оздоровчий фітнес як підсистема оздоровчо-рекреаційної рухової активності. *Фізична культура, спорт і здоров'я: стан, проблеми та перспективи*. 2019. С. 134–136.

[31] Сушко Р. О. Рейтингова оцінка популярності видів спорту в країнах із високим рівнем розвитку баскетболу. *Вісник Запорізького національного університету. Фізичне виховання та спорт*. 2015. № 2. С. 78–85.

[32] Присяжнюк С. І. Динаміка показників серцево-судинної та дихальної систем під впливом фізичного навантаження школярів загальноосвітньої школи. *Науковий часопис НПУ імені М. П. Драгоманова*. Київ: Вид-во НПУ імені М. П. Драгоманова, 2020. № 3К (123). С. 345–350.

[33] Білов С. О., Тищенко В. О. Сучасний стан і перспективи розвитку плавання в умовах війни та в післявоєнний період. *Фізичне виховання та спорт*. 2023. № 2. С. 39–46.

The analysis of literature data shows that the attitude of students to systematic physical education is superficially formal The involvement of students in various forms of organising active physical education could be improved (T. Andriushchenko, 2023; Y. Usachov, 2015; S. Prysiazhniuk, 2020).

When physiologically justified need in motor activity should special attention should be paid to the issues of motivation of schoolchildren in physical culture classes, to increase the effectiveness of the educational process, that largely extent depends not only on professionalism of the teacher, and from interest of students in active motor activity More pronounced decrease interest to classes physical exercises is observed starting with adolescent age and manifested in girls. Thematic sections dealing with the development of technical aspects of certain sports are perceived by many of them only as a necessity to obtain positive marks in "physical education"

The World Health Organization recommends that students need 60 minutes of physical activity every day. These standards are reflected in the work plans of schools in Europe. At the same time, the European Physical Education Association recommends planning at least 3 physical education lessons per week.

Studies conducted by A. Yakovenko (2019) indicate that most countries actually reduce the number of lessons with the age of students. In Poland and Germany, according to the author, the largest number of hours in educational institutions are allocated for physical activity and sports during the school day as provided for in the curriculum. At the same time, high school students in France and the United Kingdom receive the least number of physical education lessons per week. But in Finland, for example, the same number of lessons is planned for all age groups during the school year. In addition, in all European countries, it is mandatory to plan extracurricular physical activity during the school day, involving the participation of children and young people in school clubs or extracurricular sports clubs and associations. In Poland, such physical activity is generally compulsory. In other countries, participation in extracurricular or extracurricular physical activity is regulated by the motivation of children to do so. Here is an example from the experience of working with high school students in most US schools. In order to relieve fatigue and mental stress from lessons, they have introduced a daily 40-minute (extended) break – "mental unloading". During this break, the boys go to the gyms, where they are offered a large number of balls and can exercise with them at their own discretion. The girls go to the rhythmic gymnastics halls, where music is played and they enjoy dancing. At the

end of the shift, they are given soothing music and relaxation exercises. After that, all students return to class and continue their studies[34] [35].

## 2. Practical experience of using fitness equipment in physical education of high school students

The role of fitness technologies in the organization of physical education classes in secondary education institutions is growing every day. A huge number of forms of classes promotes the widespread use of fitness technologies in order to introduce them into the educational process of physical education, increases interest and stimulates students to independent fitness classes.

To increase the interest of students in physical education and health activities, it is necessary to use the types of physical activity that are most attractive and widespread among students.

Different types of fitness in the physical education and recreation activities of schoolchildren are the most popular, they are distinguished by their accessibility and positive emotional background, and a wide variety of means and methods. Fitness technologies have great potential for diverse and effective effects on the body of those involved, which makes them attractive to secondary education students.

Fitness technologies – a set of physical exercises, elements of basic movements and techniques grouped into a certain algorithm of actions, implemented in an appropriate way in the interests of improving the efficiency of the health process, which ensures guaranteed achievement of the result, based on a free motivated choice of classes using innovative means, methods, organisational forms, modern inventory and equipment[36][37].

[34] Рибачок Р. О., Проценко А. А., Суханова Г. П. Актуальність та перспективи розвитку фітнес-боксу в сучасних умовах функціонування системи оздоровчого фітнесу. *Науковий часопис Українського державного університету імені Михайла Драгоманова*. 2021. № 3 (133). С. 105–112.

[35] Сушко Р. О. Рейтингова оцінка популярності видів спорту в країнах із високим рівнем розвитку баскетболу. *Вісник Запорізького національного університету. Фізичне виховання та спорт*. 2015. № 2. С. 78–85.

[36] Присяжнюк С. І. Динаміка показників серцево-судинної та дихальної систем під впливом фізичного навантаження школярів загальноосвітньої школи. *Науковий часопис НПУ імені М. П. Драгоманова*. Київ: Вид-во НПУ імені М. П. Драгоманова, 2020. № 3К (123). С. 345–350.

[37] Combs S. A., Diehl M. D., Staples W. H., et al. Boxing training for patients with Parkinson disease: a case series. *Physical Therapy*. 2011. Vol. 91. P. 132–142.

Many authors[38] [39] [40] [41] note that the introduction of fitness technology elements into regular physical education lessons increases students' interest.

Fitness programs for high school students are represented by aerobics, step aerobics, stretching, yoga aerobics, aqua aerobics, bodybuilding, rhythmic gymnastics, strength or dance aerobics, Pilates and other types. Each of these types of aerobics has gathered considerable theoretical and practical experience[42] [43] [44].

It's worth noting that most teachers face the most common problem – a lack of equipment. That's why most gyms will be able to offer programs such as body barre, step platform classes in various formats, dumbbell gymnastics, circuit and interval training, fitness yoga, crossfit, Pilates, mix programs, exercise equipment with medicine balls and fitballs, stretching.

Fitness technologies, as noted by O. Dubynska (2017), are divided into educational, recreational, rehabilitation and sports[45]. Sports technologies such as CrossFit (high-intensity cardio and strength programs, and there are currently CrossFit competitions). Further sports areas include functional training, with an increase in the amount of high-intensity aerobic exercise, "explosive" exercises, "impact" exercises, interval training, burpees, planks and many others. Functional training is recommended for trained students

[38] Масляк І. П. Вплив аеробіки силової спрямованості на стан кардіо-респіраторної системи школярів старших класів. *Науковий часопис НПУ імені М. П. Драгоманова*. Київ, 2017. Вип. 1 (82). С. 35–38.

[39] Петрушин Д. В., Хованова Д. О. Травмування під час тренування у спортивній секції з боксу, пов'язане з недостатньою фізичною підготовленістю курсантів. *Єдиноборства*. 2019. С. 81–87.

[40] Петрова А., Бала Т., Іванова Ю. Вплив вправ кросфіту на показники функціонального стану дихальної системи учнів 16 років. *Актуальні проблеми фізичного виховання різних верств населення*. 2024. С. 47–54.

[41] Присяжнюк С. І. Динаміка показників серцево-судинної та дихальної систем під впливом фізичного навантаження школярів загальноосвітньої школи. *Науковий часопис НПУ імені М. П. Драгоманова*. Київ: Вид-во НПУ імені М. П. Драгоманова, 2020. № 3К (123). С. 345–350.

[42] Єланська О. О. Вплив засобів карате на психофізичний та духовно-моральний розвиток підлітків. *Фізичне виховання та спорт*. 2023. № 3. С. 16–22.

[43] Рибачок Р. О., Проценко А. А., Суханова Г. П. Актуальність та перспективи розвитку фітнес-боксу в сучасних умовах функціонування системи оздоровчого фітнесу. *Науковий часопис Українського державного університету імені Михайла Драгоманова*. 2021. № 3 (133). С. 105–112.

[44] Турчик І. Х. Фізичне виховання і спорт у шкільній освіті Європи: монографія. Дрогобич: Швидкодрук, 2017. 138 с.

[45] Борисова Ю., Шкарупіло П. Вплив занять капоейрою на фізичну підготовленість і соматичне здоров'я дітей 15–16 років. *Спортивний вісник Придніпров'я*. 2017. № 1. С. 113–117.

who play for national teams and athletes who need to improve their special physical fitness.

The global fitness and recreation industry has recently seen an incredible leap in innovative physical activities, driven by increasing consumer demand for the latest, most interesting health and fitness training programmes, accompanied by the emergence of new fitness trends.

Scientific works Zubchenko L. V., Golik In. A. (2015) dedicated to the integration of the American direction “Fitness Boot Camp”, whose programme is built on principles of training of American recruits in physical education of young men of high school. The innovative “Fitness Boot Camp” program was designed to increase motivation for sports and physical activity, promote the development of physical and volitional qualities, and the body’s resistance to adverse environmental factors and stressful situations.

A number of researchers have studied the effectiveness of the use of crossfit equipment in physical education in general secondary education. For example, Tomashchuk O., Dedeliuk N., Kovalchuk N., Demianchuk O., Voitovych I. (2024)[46] studied the health, developmental, educational opportunities of crossfit to improve the effectiveness of physical education in various educational institutions. The author has developed a variable module "CrossFit" for implementation in the lesson form of senior pupils’ classes and determined the positive impact of crossfit on the physical fitness of senior pupils.

Since the purpose of our analysis is the content of fitboxing classes, it is necessary to consider traditional martial arts, which are most often used in the practice of fitness with elements of martial arts[47].

Fitness programs are based on martial arts. Today, there are a number of wellness areas based on martial arts and combat sports that include English boxing exercises in their content, among the leaders are Tai-Bo and A-Box. According to Y. Usachev (2015), A-Boxis the earliest direction of health aerobics with elements of martial arts. Its appearance is associated with Yvonne Lynn (Sweden), who in 1983 proposed to include elements of martial arts and boxing in the content of classical aerobics[48].

---

[46] Томащук О., Деделюк Н., Ковальчук Н., Дем’янчук О., Войтович О. Інноваційні підходи до організації фізичного виховання школярів. *Вісник Прикарпатського університету. Фізична культура*. 2024. Вип. 42. С. 31–35.

[47] Єланська О. О. Вплив засобів карате на психофізичний та духовно-моральний розвиток підлітків. *Фізичне виховання та спорт*. 2023. № 3. С. 16–22.

[48] Ажиппо О. Ю., Мамешина М. А. Оцінка функціонального стану кардіо-респіраторної системи учнів основної школи. *Актуальні проблеми фізичного виховання різних верств населення*. Харків: ХДАФК, 2019. С. 15–23.

According to a number of authors[49][50]Tai-bo training is the basis for other fitness programs, such as:Aerobox, Kick-Box, KIBO, and others.

The next sport that attracts fitness instructors is kickboxing. Currently, kickboxing is divided into contact (seven-contact, light-contact, full-contact, low-kick) and non-contact (solo compositions). However, it should be noted that English boxing combined with kicking was already known in Europe in the XIX century as savate – French boxing.

From Wikipedia: “French boxing (savate) is a French martial art that uses both hands and feet equally. In modern savate, punches are thrown with fists, using boxing gloves. Kicks are delivered with the foot (rib, toe, sole, heel)”[51].

Muay Thai (Thai boxing) is another type of martial arts that is quite popular in the fitness industry. Modern Thai boxing in Thailand isconsidered a cure for all diseases, and its use is practiced in institutions to overcome stress, in clinics to combat excess weight and in the treatment of addictions.

Today, boxing is the most popular form of martial arts. In his training manual "Boxing", A.F. Getier praised amateur boxing and noted: “Boxing training is one of the best ways to create a fully developed athlete. Boxing training involves the entire muscular system of the trainee and develops a number of mental qualities: composure, perseverance, determination, courage. In his opinion, boxing training can be recommended to any athlete, regardless of their sport”/

At the stage of development, boxing continues to be a part of the physical education system, and therefore is not limited to sports issues. The goal of modern boxing is to introduce the most effective system of physical development to large masses of people, which allows them to develop and maintain functional fitness not only through sports training, but also through health improvement. For recreational training, it is

[49] Рибачок Р. О., Проценко А. А., Суханова Г. П. Актуальність та перспективи розвитку фітнес-боксу в сучасних умовах функціонування системи оздоровчого фітнесу. *Науковий часопис Українського державного університету імені Михайла Драгоманова*. 2021. № 3 (133). С. 105–112.

[50] Todorova V., Rybalko P., Dubynska O., Khomenko O., Gvozdetska S., Krasilov A., Yevtushenko Y. MMA exercises in physical education of 17–18 year old students. Propósitos y Representaciones: Revista de Psicología Educativa. Journal of Educational Psychology. 2021. Vol. 9, SPE(3). P. e116.

[51] Петрушин Д. В., Хованова Д. О. Травмування під час тренування у спортивній секції з боксу, пов’язане з недостатньою фізичною підготовленістю курсантів. *Єдиноборства*. 2019. С. 81–87.

recommended to reduce regulatory requirements, exclude the competition system, and use non-contact boxing[52].

When considering foreign publications, the work of the American boxing coach G. Rock, who wrote the book "Fitness Boxing: All Men Knocked Out!", is no less significant in this regard. The author considers fitness boxing in the form of an individual programme for women, based on the theoretical and methodological principles of boxing[53].

R. O'Donnell, in his book "The Ultimate Fitness Boxing & Kickboxing Workout", presents fitness boxing as a fitness workout that includes exercises from two types of martial arts, boxing and kickboxing, the structure of which is based on the principle of boxing and kickboxing training sessions in 2-3 minute rounds with 30-60 second breaks. The content of such classes includes punching and kicking combinations of varying complexity[54].

C. Rodriguez[55] in his book "Fitness Boxing" proposes to conduct fitness boxing training based on the principle of fitness training, where all classes are conducted in the "shadow fight" mode. The types of punches and kicks used in fitness boxing, defensive actions, and fitness exercises are used in a modified form and alternate at a fast pace, without pauses and without working in pairs. The duration of such classes is up to 30 minutes and they are held at least 3 times a week, with 1 day of rest between them[56].

According to the opinion of a number of Ukrainian scientists and professional fitnessinstructors, fitnessboxing is training classes of anaerobicand aerobic orientation, based on movements and special exercises, which are widely used in their professional practice by boxers of different qualifications.

Scientists have proved the effectiveness of the use of sports boxing classes for older boys to improve their functional state, physical and mental fitness and technical skills.

---

[52] Андрющенко Т. Організаційно-методичні умови застосування засобів скіпінгу у фізичному вихованні старшокласників. *Спортивний вісник Придніпров'я*. 2023. № 3. С. 3–10.

[53] Пащенко Т. М. Самостійність як риса особистості. *Нові технології навчання: науково-методичний збірник*. Київ, 2004. Вип. 36. С. 285–293.

[54] Масляк І. П. Вплив аеробіки силової спрямованості на стан кардіореспіраторної системи школярів старших класів. *Науковий часопис НПУ імені М. П. Драгоманова*. Київ, 2017. Вип. 1 (82). С. 35–38.

[55] Томащук О., Деделюк Н., Ковальчук Н., Дем'янчук О., Войтович О. Інноваційні підходи до організації фізичного виховання школярів. *Вісник Прикарпатського університету. Фізична культура*. 2024. Вип. 42. С. 31–35.

[56] Петрушин Д. В., Хованова Д. О. Травмування під час тренування у спортивній секції з боксу, пов'язане з недостатньою фізичною підготовленістю курсантів. *Єдиноборства*. 2019. С. 81–87.

Elanskaya, O. O. (2023). Sayenko, V. G. (2021)[57] recommends including elements of martial arts in the school curriculum, justifying their impact on all aspects of the personality: physical, mental, especially in today's conditions of terrorism and aggression. The author Yelanska, O. O. (2023) convinces that the use of elements of traditional karate in the educational process of high school students as an innovative sports-oriented means of physical education will help to improve physical abilities, improve the functional reserves of the body of students, and will positively affect the formation of personal qualities[58] including strengthening the spiritual and emotional spheres.

A considerable number of authors point to the need to introduce into the educational process means aimed at improving the physical condition of students. In their work, the authors Petrushyn D.V., Khovanova D.O. (2019)[59] substantiate the expediency of using boxing equipment to improve the physical fitness of high school students, reveal in detail the complex of means and methodological techniques for using boxing equipment in the sectional work of cadets, and consider the issue of injury prevention in boxing classes.

Researchers Bazylevych, N., Yurchenko, I., Tonkonoh, O.(2023)[60] considered issues of implementation of sportsorientated forms of organisation of classes for to optimise physical preparedness of pupils of senior school in school section of boxing. The authors emphasise the need to optimise the process of physical training of high school students, taking into account the situation related to military events in the country.

Thus, the analysis of professional literature has shown that oriental systems of physical exercises are actively cultivated in different countries and play a key role in shaping a healthy lifestyle of schoolchildren.

As a conclusion, we can say that each of these sports is offered to large numbers of people, and when used as a form of conditioning training, they have a health-promoting effect for those who participate.

---

[57] Єланська О. О. Вплив засобів карате на психофізичний та духовно-моральний розвиток підлітків. *Фізичне виховання та спорт*. 2023. № 3. С. 16–22.

[58] Єланська О. О. Вплив засобів карате на психофізичний та духовно-моральний розвиток підлітків. *Фізичне виховання та спорт*. 2023. № 3. С. 16–22.

[59] Петрушин Д. В., Хованова Д. О. Травмування під час тренування у спортивній секції з боксу, пов'язане з недостатньою фізичною підготовленістю курсантів. *Єдиноборства*. 2019. С. 81–87.

[60] Базилевич Н., Юрченко І., Тонконог О. Вплив занять боксом на фізичну підготовленість учнів старшої школи. *Науковий часопис Українського державного університету імені Михайла Драгоманова*. 2023. № 3К (162). С. 48–54.

### 3. Content and structure of fitboxing training methods in the conditions of circle work for senior school age boys

The pedagogical experiment was conducted according to the methodology of health-improving training sessions developed on the basis of the use of modern fitness systems[61] and was designed for an annual cycle. The pedagogical experiment involved two groups of senior school-age boys (12 in each group) from school No. 22.

For the experimental group, we developed a methodology for training sessions based on the use of modern fitness systems (fitboxing as the main tool and crossfit and rope skipping as auxiliary tools).

The structure of a fitboxing training session is based on a health-improving boxing training and is built according to the traditional structure of a lesson, which is represented by the preparatory, main and final parts[62] [63] with the use of musical accompaniment. The main part of the group exercise class, as a rule, makes up 65-80% of the total time, while, according to the developed methodology, the amount of physical activity is within the optimal and peak heart rate. The remaining time (20-35%) is distributed between the preparatory and final parts, in which physical activity is in the threshold and optimal heart rate zone[64].

Figure 1 shows a structural and logical diagram of the construction of fitboxing classes for senior school students.

As you know, the preparatory part of the lesson consists of warming up and stretching, which are used in the warm-up to functionally adjust the body and prepare the musculoskeletal system for the next load (increased heart rate, increased blood flow to the muscles, increased body temperature, etc.) The duration of the preparatory part of the proposed fitness boxing methodology is from 10 to 20 minutes, using general developmental exercises in combination with basic aerobic steps:march,openstep,step-touch,v-step,kneeup,kneelift, etc., as well as various types of running and jumping. It is recommended to use low and medium intensity movements.

In accordance with the developed methodology, the main part of the fitness boxing class is aimed at maintaining or developing physical qualities,

---

[61] Борисова Ю., Шкарупіло П. Вплив занять капоейрою на фізичну підготовленість і соматичне здоров'я дітей 15–16 років. *Спортивний вісник Придніпров'я*. 2017. № 1. С. 113–117.

[62] Єланська О. О. Вплив засобів карате на психофізичний та духовно-моральний розвиток підлітків. *Фізичне виховання та спорт*. 2023. № 3. С. 16–22.

[63] Карабанов Є., Білогур В., Крупіна Л., Кубрак С. Європейський досвід системи фізичного виховання: застосування в Україні. *Вісник Прикарпатського університету. Фізична культура*. 2024. Вип. 42. С. 10–16.

[64] Турчик І. Х. Фізичне виховання і спорт у шкільній освіті Європи: монографія. Дрогобич: Швидкодрук, 2017. 138 с.

largely general endurance, using the variable-interval method[65] which has become widespread both in physical education, recreational physical culture[66] [67]and in sports of higher achievements (pic. 1)[68].

In this case, its essence is in systematic alternation of rounds – the phases of load with stages of active rest Practice using method variable-interval exercises during training classes fitness-boxing with young men older age allows provides better morphological and functional adaptation of the cardiorespiratory system[69] [70].

The structure of the aerobic part follows the recommendations proposed in health aerobics by O. Dubynska, 2011 (Table 1):

– "aerobic warm-up" – 5–10 minutes, which includes movement stances, movements, types of defenses, single kicks and punches and a set of movements of a complex coordination nature (combinations, combinations of striking techniques in combination with aerobic steps), jumping rope; the pace of the exercises is medium;

– "aerobic peak" – 20–30 minutes, which included intensive exercises and consisted of combinations of percussion technique combined with aerobic steps: open step, step-touch, lunge, squat, jumping jack, etc., strength exercises, active rest (types of walking, static and dynamic exercises, general development exercises for muscles of arms and shoulder girdle, trunk and legs, or breathing exercises). This period of aerobic exercise is subordinated to the maintenance of intensity: an average exercise intensity of 65% to 80% of the max heart rate is recommended, with a gradual increase in the amplitude, speed, and emphasis of combat exercises.

– "the first aerobic "hiccup" – 3–5 minutes, the training moves to a slower pace, using various types of walking, basic aerobics steps, as well as breathing exercises; the pace of the exercises is medium, low impact.

---

[65] Петрушин Д. В., Хованова Д. О. Травмування під час тренування у спортивній секції з боксу, пов'язане з недостатньою фізичною підготовленістю курсантів. *Єдиноборства*. 2019. С. 81–87.

[66] Турчик І. Х. Фізичне виховання і спорт у шкільній освіті Європи: монографія. Дрогобич: Швидкодрук, 2017. 138 с.

[67] Коваленко Ю. О., Дорошенко І. Е. Вплив секційних занять із футболу на фізичний розвиток та функціональний стан старшокласників. *Фізичне виховання та спорт*. С. 33–37.

[68] Combs S. A., Diehl M. D., Staples W. H., et al. Boxing training for patients with Parkinson disease: a case series. *Physical Therapy*. 2011. Vol. 91. P. 132–142.

[69] Кравчук Т. М., Сорока О. С. Особливості фізичної підготовленості учнів старших класів державних та приватних освітніх закладів. *Теорія та методика фізичного виховання*. 2014. № 2.

[70] Combs S. A., Diehl M. D., Staples W. H., et al. Boxing training for patients with Parkinson disease: a case series. *Physical Therapy*. 2011. Vol. 91. P. 132–142.

In the main part of the health-improving training session, we included elements of cross-fit as an auxiliary means after the end of the main aerobic peak for a little more than 10-15 minutes. The complexes included bodyweight exercises and exercises with weights of no more than 50% of the maximum weight. In the power complex, special attention was paid to explosive and high-speed strength.

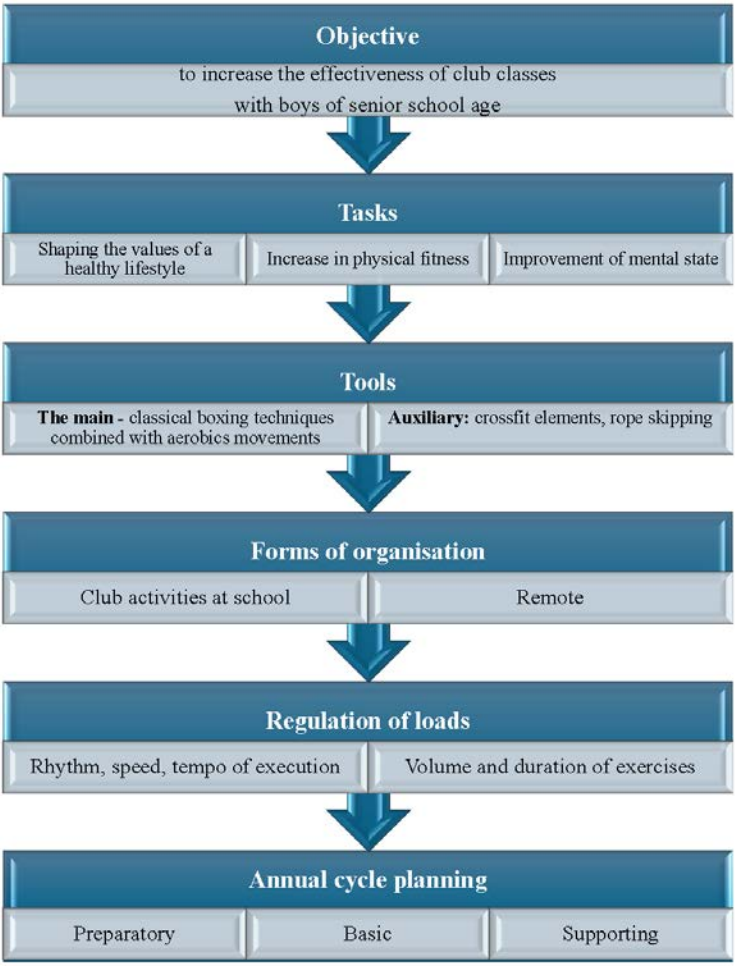


**Fig. 1. Structural and logical diagram of fitboxing classes for senior school age pupils**

Table 1

**The structure of the lesson according to the developed method of fitboxing for senior school age boys**

| **Classes** | | | | |
|---|---|---|---|---|
| **Preparatory (15 min.)** | | **Main (65xv.)** | | **Final part (10 min.)** |
| **Theoretical component** | **Warm-up** | **Aerobic component** | **Auxiliary block** | **Recovery block** |
| 1. Announcement of class assignments, learning terminology.<br>2. Methodical guidelines for exercise technique and quality of exercise | 1. General developmental exercises (GDE) for hands and shoulder girdle, torso and neck, legs, imitation of blows with hands and feet in combined with basic aerobic steps: march, openstep, step-touch, v-step, etc. Varieties of running and jumping.<br>2. Stretching – from 5 to 10 minutes | 1. Stances, movements, movements, types of protection with with the help of hands, movement.<br>2. Single punches and kicks; combinations, combinations of percussion techniques in in combination with aerobic steps<br>3. Combinations of of percussion techniques combined with aerobic steps: | 1. Strength exercises (squats, bending and turning the torso, bending and extending arms, etc.)<br>2. A set of exercises with elements of crossfit to improve physical fitness<br>3. A set of rope skipping rights for endurance development. | 1. Relaxation exercises.<br>2. Breathing exercises |
| Methodological recommendations | | | | |
| Perform general developmental exercises, special physical training exercises, flexibility exercises with a small range of motion | Perform exercises at a medium to high pace with a gradual and consistent increase in intensity | | It is recommended to perform exercises at an average pace with an average amplitude of movements | It is recommended to perform relaxation exercises and breathing exercises |

CrossFit is a system of strength and general physical training and high-intensity functional training. This system is designed to elicit the most sincere adaptive response from the body. CrossFit develops all the components of a person's physical fitness in a balanced way: cardio-respiratory endurance, performance, strength, flexibility, speed, power, coordination, accuracy, sense of balance and agility.

We tried to select exercises that are most similar to the movements that occur during combat. Through simulation exercises, we improved technique (punching, throwing movements), speed and strength. Cross-fit exercises adapted to this age were used. The individualisation of the load was carried out by changing the rest intervals, changing the amount of external resistance, and even changing the pace of exercise, taking into account the subjective perception of the severity of the tasks.

The essence of the cross-fit complexes developed by us is as follows: exercises to improve functional fitness were included in the main part as an auxiliary means of physical fitness; the main means of developing this indicator were exercises with the weight of one's own body and with weights performed in a minimum amount of time, differing in duration, rest intervals and muscle groups affected.

Rope skipping (jumping rope) is one of the basic exercises in boxer training. Rope skipping training develops coordination of movements, speed movement, reaction speed, quality of footwork, endurance.

A lightweight high-speed rope was used, as it allows you to maintain a fairly high pace. At each training session, different types of jumps were used with an emphasis on technique.

Each training session involved jumping rope for several rounds.

The final part of the class involves reducing the load, which ensures the recovery of the functional systems of the trainees. Stretching and breathing exercises and relaxation are performed. The final part lasts 15–23 minutes.

It should be noted that if the duration of a practical fitness boxing lesson is 90 minutes, it is proposed to extend the warm-up (20–25 minutes) in the first four lessons, while reducing the "aerobic peak" to adapt students to the proposed load.

Based on the analysis of scientific and methodological literature, it can be said that fitness boxing uses a variety of physical actions offered by martial arts to develop strength: prolonged performance of different types of blows, fast long movements, defensive actions, etc. These workouts do not use exercises with heavy weights, but rather exercises to overcome the inertia of one's own weight, accentuated strikes, general strength exercises

with objects and a partner, etc.[71] [72] [73]. The use of these physical activities in compliance with the technique will help to develop the strength of various muscle groups, form posture and prevent spinal diseases.

During classes fitness- the boxing technical actions of sport martial arts are performed not only as single exercises, but and in combinations, and some of such combinations are quite complicated and are far not immediately, such physical activity allows to develop agility in those who are engaged in . It should also be noted that in order to develop agility, fitness boxing uses exercises that require a quick change of situation: frequent changes from left to right and vice versa, alternating attacking and counterattacking actions, performing combinations of punching techniques of hands and feet, combinations of punching techniques in combination with aerobic steps, etc. As a result, individual joints are developed, their mobility increases, coordination of movements and the vestibular system are trained.

Due to the peculiarities of fitness boxing, speed development is an integral part of it. After all, it is known that during boxing training, the speed of movement, the frequency of movements and the speed of motor reaction develop. Performing a fitness boxing complex will increase the speed of single punches, series of punches, movement speed, defensive reaction time, etc.[74].

Performing a cyclic set of aerobic exercises lasting up to 90 minutes, which is offered by a fitness boxing class, contributes to the development of endurance: general, prolonged work of moderate and medium intensity with global functioning of the muscular system, and special, development of strength endurance, coordination.

In addition to the above said, it is necessary to note the inverse relationship between strength, speed and endurance, which are in this direction: "explosive" force indicates the presence of speed; frequency of explosive actions is determined by speed endurance; long performance of impacts, protective processes, movements with preservation

[71] Андрющенко Т. Організаційно-методичні умови застосування засобів скіпінгу у фізичному вихованні старшокласників. *Спортивний вісник Придніпров'я*. 2023. № 3. С. 3–10.

[72] Масол В. Особливості виховання рішучості старшокласників у процесі занять фізичною культурою. *Науковий часопис Українського державного університету імені Михайла Драгоманова*. 2020. № 5 (125). С. 106–109.

[73] Яковенко А. Сучасний стан фізичного виховання школярів у європейських країнах. *Вісник Прикарпатського університету. Серія: Фізична культура*. 2019. № 33. С. 125–132.

[74] Петрушин Д. В., Хованова Д. О. Травмування під час тренування у спортивній секції з боксу, пов'язане з недостатньою фізичною підготовленістю курсантів. *Єдиноборства*. 2019. С. 81–87.

of frequency of effective processes, speed, accuracy characterises development of endurance[75] [76] [77].

The principle of accessibility is closely related to the optimisation of the curriculum, and is reflected in the choice of means, methods, and organisational resources for the physical activity of training sessions.

It is equally important that fitboxing classes are held against a positive psycho-emotional background, which helps to “relieve stress”, “relax” the psyche, and causes peace and comfort after classes.

The accessibility of fitboxing classes is due to the balance between the complexity of the programme, which means the distribution of the complexity of mastering the elements of martial arts and fitness, and the readiness of students to perform it, i.e. the use of exercises in accordance with the level of physical fitness and individual characteristics of students.

The first lessons, and subsequently the entire period of study, should begin with movements that are accessible to students, following a certain sequence: mastering frontal and fighting stances; mastering basic aerobics steps; mastering movements in frontal and fighting stances (with a step to the left and right, as well as movements using basic aerobics steps); mastering defenses, slopes, backward movements modified to fit a fitness programme; learning to punch with hands should begin with a direct punch from the frontal stance: mastering a direct punch with the front hand to the head and torso with a step forward and other movements, it is possible to use basic aerobics steps; mastering a direct punch with the strongest hand to the head and torso with a step forward with the front foot; mastering a side kick in a frontal stance and with a forward and backward movement; mastering a bottom kick in a frontal stance and with a forward and backward movement; learning to kick with direct kicks from a frontal stance: mastering direct frontal kicks to the leg, torso, and head; mastering direct lateral kicks to the leg, torso, and head; mastering side kicks to the leg, torso, and head; mastering knee strikes at short and then long range.

The whole period of training should be built on the principle of gradual increase of load, observing the following points learning technical processes: Slow execution of technical techniques; staging strokes in accordance with

[75] Андрющенко Т. Організаційно-методичні умови застосування засобів скіпінгу у фізичному вихованні старшокласників. *Спортивний вісник Придніпров’я*. 2023. № 3. С. 3–10.

[76] Масол В. Особливості виховання рішучості старшокласників у процесі занять фізичною культурою. *Науковий часопис Українського державного університету імені Михайла Драгоманова*. 2020. № 5 (125). С. 106–109.

[77] Яковенко А. Сучасний стан фізичного виховання школярів у європейських країнах. *Вісник Прикарпатського університету. Серія: Фізична культура*. 2019. № 33. С. 125–132.

kinematic chain: foot – lower leg – hip – pelvis – trunk – shoulder – forearm – hand or foot – lower leg – hip – pelvis – trunk – thigh – lower leg – foot; focus attention on breathing; gradually increase the amplitude of movements; increase the speed of movements; pay attention to accents and concentration of strokes when performing.

As it is known from the scientific and methodological literature, the volume and intensity of physical activity in group classes allow optimising its volume and intensity: 1) the volume of training load is regulated by increasing the number of repetitions performed with greater amplitude, as well as by including more complex exercises in fitness boxing complexes; 2) the intensity is increased by performing exercises at a faster pace, as well as by using high-impact and coordinated movements, which can be regulated by the musical accompaniment used in the classes.

Thus, in the organization of fitness boxing classes, it is proposed to divide the annual cycle into three periods, each of which is responsible for increasing the volume or intensity of the load: fitboxing without objects, elements of rope skipping with a rope, which allows you to control the dynamics of the load and influence its content.

When creating a fitness boxing complex, the choice of music is of great importance. After all, as you know, due to its characteristics, namely the tempo, music can conduct the intensity of the load[78]. The tempo of the music is selected depending on the nature of the exercise and is calculated taking into account the number of rhythmic accents per minute (acc/m).

After selecting the exercise and composing a set of musical fragments with the appropriate tempo, a phonogram is recorded to perform the entire complex.

As a result, the fitness boxing classes used modern, clearly sounding melodies with rhythmic accents that help determine the tempo of movements[79] with clearly expressed musical accents (beats), determined by the number of beats per minute and a square structure, i.e. one in which the musical phrase has 4 parts (beats) of equal duration. For the final part of the lesson “Music for relaxation”.

[78] Присяжнюк С. І. Динаміка показників серцево-судинної та дихальної систем під впливом фізичного навантаження школярів загальноосвітньої школи. *Науковий часопис НПУ імені М. П. Драгоманова*. Київ: Вид-во НПУ імені М. П. Драгоманова, 2020. № 3К (123). С. 345–350.

[79] Ажиппо О. Ю., Мамешина М. А. Оцінка функціонального стану кардіореспіраторної системи учнів основної школи. *Актуальні проблеми фізичного виховання різних верств населення*. Харків: ХДАФК, 2019. С. 15–23.

## 4. Dynamics of changes in indicators of physical fitness and functional state of boys of senior school age under influence of fitboxing.

We conducted experimental researches to solve the tasks of our work, to check the influence of fitness boxing technique on the components of speed, strength, flexibility, endurance and agility of senior school age boys.

T. Krutsevych's manual states: "...Physical fitness is the result of a person's motor activity, its integral indicator, because during physical exercises almost all organs and systems of the body interact". To determine the impact of fitboxing methodology on physical abilities of senior pupils, we used the State Exercise Tests. As can be seen from Table 2, the control and experimental groups (n=40) were formed in such a way that at the beginning of the experiment they did not differ significantly in terms of the level of physical qualities development.

Endurance was determined by comparing the results of performing such motor tasks as running 2 km. The physical quality "strength" is determined on the basis of such physical exercises as pulling up on the bar, raising the legs to the bar, bending and extending the arms in a lying position, a complex strength exercise, and lifting. Speed is determined by performing high-speed exercises that comprehensively demonstrate all aspects of speed – 100 m run, 4 x 9 m shuttle run. Flexibility is determined by the exercise "tilt the torso forward from a sitting position"

As can be seen from Table 2, in the test "pull-ups on the transferred" after the introduction of the innovative methodology of circle classes the results are equal: 12.46 + 4.95 in the experimental group and 10.16 2 $\pm$ 0.77 in the control group . The increase of indicators of arm strength is 45,9% that is explained by the choice of means to the programme with the purposeful use of elements of cross-fit for the improvement of indicators of power qualities. Analysing the results of the experimental materials, the indicators in the experimental group of young men ($p < 0.005$), describing the increase in strength abilities, were statistically significant in comparison with the control group (Table 2).

Upon completion of the pedagogical experiment, we observed positive dynamics in the indicators of explosive power in the test "ong jump from a standing position". Thus, in the experimental group of young men, the indicators improved by 11%, while in the control group there were no changes in the indicators.

When comparing the results of the control and experimental groups, we recorded a significant difference at the final stage of the experiment ($p < 0.005$).

Indicators of flexibility of the spinal column were calculated by the test "tilt of the trunk forward from a sitting position". As can be seen from Table 2, at the end of the experiment, senior school age boys of the

experimental group performed this test by 6.58 ± 2.19 sm, and the control group of boys showed an indicator of 4.37 ± 2.28 sm, with a percentage increase of 42%.

Table 2

**Changes in physical fitness indicators of senior school age boys under the influence of fitness boxing classes**

| | | | | | | |
|---|---|---|---|---|---|---|
| Tilt the torso forward sitting | К | 4,81 ± 0,41 | | 4,37 ± 2,28 | -9,15 | |
| | Е | 4,63 ± 0,41 | > 0,2 | 6,58 ± 2,19 | 42,12 | < 0,02 |
| Run 100 m | К | 10,64 ± 0,84 | | 10,47 ± 0,86 | 1,62 | |
| | Е | 10,46 ± 0,92 | > 0,2 | 9,63 ± 0,73 | 8,62 | < 0,001 |
| Long jump | К | 181,85 ± 6,58 | | 182,8 ± 9,82 | 0,52 | |
| | Е | 184,24 ± 9,82 | > 0,1 | 204,46± 13,04 | 10,97 | < 0,005 |
| Cross 2000 m | К | 9,34 ± 0,41 | | 9,41 ± 0,56 | -0,74 | |
| | Е | 9,29 ± 0,5 | > 0,2 | 8,19 ± 0,45 | 13,43 | < 0,001 |
| Pullups on the bar | К | 8,33 ± 3,52 | | 8,93 ± 2,0 | 7,2 | |
| | Е | 8,54 ± 2,8 | > 0,2 | 12,46 ± 4,95 | 45,9 | < 0,005 |
| The shuttle run 4 x 9 m | К | 10,37 ± 0,64 | | 10,16 ± 0,77 | 2,07 | |
| | Е | 10,23 ± 0,58 | > 0,2 | 9,21± 0,59 | 11,07 | < 0,005 |

In our proposed methodology of fitness boxing classes, stretching exercises were used to improve flexibility, both at the beginning of the health and training session and in the final part. We believe that the regular inclusion of stretching exercises contributed to such a high increase in this quality.

The data presented in Table 2 indicate that the boys of the experimental group have a significantly ($p < 0.02$) higher level of flexibility.

At the end of the research in the experimental group of boys, indicators of speed make 9.63±0.73 s, that is on 9% more, comparing to the beginning of the academic year, while in the control group – 10.47 ± 0.84 s.

Analysing the obtained materials of the research it was found that the level of speed qualities in the experimental group of boys is significantly ($p < 0.001$) higher than in the control group (Table 2).

The level of general endurance of senior school age boys was determined by means of the test “running for 2000 m”. After the implementation of the experimental fitboxing technique, we obtained the following results: in the experimental group the indicator is 8.19 ± 0.45 min, which is 13.4% higher than the previous data. Instead, in the control group of pupils, the test result

even deteriorated by 1% compared to the initial stage and is 9.41 ± 0.56 min. The analysis of the data obtained indicates a statistically significant difference ($p < 0.001$) in the endurance indicators in the experimental group compared to the control group.

We used the 4 x 9 mshuttle run test to determine the boys' level of agility. The results in the experimental group were 9.21 + 0.59s, and in the control group – 10.16 ± 0.77s. The growth rate in the experimental group was 11%, while in the control group this figure increased by only 2%. Changes in the indicators of the experimental group of young men compared to the control group indicate a significant difference ($p < 0.005$).

At the end of the observation, there were no significant changes in the analysed indicators in the control group. After nine months of fitness trainings based on the predominant use of boxing means, young men had a decrease in fatigue during exercise, as judged by the dynamics of their subjective feelings and a 26.8% decrease in heart rate during training to the level of 106.5±9.2 beats per minute.

The results of the experiment testify to the effectiveness of fitboxing in the context of improving the physical fitness of senior school age boys:

– The difference in physical fitness indicators of the experimental group of young men was statistically significant compared to the control group ($p < 0.001$). Indicators of physical fitness according to the State Tests in the experimental group of high school students increased from 8 to 42%, while in the control group – from 0.5 to 6%.

In order to determine the influence of fitboxing means on the level of functional reserves of the respiratory system, we measured the vital capacity of the lungs (l), time of breath holding on inspiration (Stange test) (s), heart rate at rest (bpm) at the beginning of the academic year. Analysing the data obtained as a result of the experiment, it was found that there were no significant differences in the indicators of young men of the control and experimental groups in all parameters ($p > 0.05$).

Comparing the obtained indicators of functional capacities of the respiratory system after the introduction of the experimental technique of fitness classes on the basis of the use of boxing means we did not record significant changes in indicators of the functional state of young men of the control group ($p>0.05$), the data are given in Table 3.

As it can be seen from Table 3, the index of VC at the beginning of the experiment in the main group was equal to 2.83 ± 0.16, after the introduction of fitboxing technique in the group work of young men it increased by 27% and made up 3.94 ± 0.09, we recorded statistically significant changes ($p < 0.001$).

Comparing the data reflecting the body's resistance to hypoxic phenomena (Stange test), we found a significant improvement in the results in the experimental group of young men under the influence of fitness boxing.

Table 3

**Dynamics of Changes in the Indicators of Functional Capabilities of the Respiratory System of Senior School Boys**

| **Indicators** | | **Control group (n=20)** | **Experimental group (n=20)** |
|---|---|---|---|
| Vital Capacity (VC), litrs | Before | 2,79±0,19 | 2,83±0,16 |
| | After | 2,87±0,26 | 3,94±0,09 |
| P | | p>0,05 | p<0,001 |
| Stange test, s | Before | 33,41±2,07 | 33,21±2,02 |
| | After | 34,50±1,29 | 44,09±1,38 |
| P | | p>0,05 | p<0,001 |
| Heart rate at rest, bpm | Before | 76,93±2,34 | 77,23±2,34 |
| | After | 76,21±1,46 | 69,02±1,45 |
| P | | p>0,05 | p<0,01 |

Thus, at the beginning of the academic year the indicator was $33.21 \pm 2.02$, during the academic year it increased to $44.09 \pm 1.38$, an increase of 29%. The analysis of the results shows a statistically significant difference ($p < 0.001$) in the respiratory system indicators with the breath-hold test.

At the end of our experiment, we determined the level of efficiency of the cardiovascular system using the "resting heart rate" test. The data we obtained after the experiment indicate a significant decrease in the results of the boys of the experimental group ($p < 0.01–0.001$), which indicates an improvement in cardiovascular performance and more efficient heart function.

**CONCLUSIONS**

1. At present, the problem of health of high school students seems to be the most urgent, since the well-being of young families, production potential and defence capability of the country depend on the health of graduates of general secondary education institutions. Only 6-8% of school leavers are recognised as healthy, one in two has a morphological and functional pathology, and 42% have chronic diseases.

2. The organization and content of physical education and sports work at school needs to be critically reviewed. The introduction of new means of physical culture and sport into the process of physical education of senior pupils is one of the promising ways of its improvement.

3. Currently, a large number of different approaches and technologies are used in the practice of physical education of senior school students in extracurricular activities: sports, health, oriental, fitness technologies, valeological, etc. According to our observations, the most attractive type of sports activity for senior pupils is fitness training based on different types of martial arts.

4. The structure of a fitboxing training session is based on boxing training and is built according to the traditional structure of a lesson, which is represented by the preparatory, main and final parts with the use of musical accompaniment.

5. The results of the experiment testify to the effectiveness of fitboxing application in the context of improving physical fitness of senior school age boys:

– The difference in physical fitness indicators of the experimental group of young men was statistically significant compared to the control group ($p < 0.001$). Indicators of physical fitness according to the State Tests in the experimental group of senior pupils increased from 8 to 42%, while in the control group – from 0.5 to 6%;

6. After the implementation of our proposed methodology with the use of fitboxing means, there is an increase in the indicators of both the main and control groups, but the best results were found in the experimental group, but the data are not significant ($p>0.05$).

**SUMMARY**

The article analyses the scientific professional literature on the experience of improving physical education of senior pupils through the introduction of the latest health-improving technologies. According to our observations, the most attractive type of sports activity for senior pupils is fitness training based on different types of martial arts. The structure of the health-improving lesson developed by us is based on the use of boxing means and is built according to the traditional structure of the lesson, which is represented by the preparatory, main and final parts with the use of musical accompaniment. The results of the experiment demonstrate the effectiveness of fitboxing in the context of improving the physical fitness of senior school age boys. Indicators of physical fitness according to the State Tests in the experimental group of high school students increased from 8 to 42%, while in the control group – from 0.5 to 6%.

## BIBLIOGRAPHY


1. Campos F., Lourenço Martins S. G., Víllora S. Benefits of 8-week fitness programs in health and fitness parameters. *Nuevas Tendencias en Educación Física, Deporte y Recreación*. 2019. No 35. P. 224–228.

2. Combs S. A., Diehl M. D., Staples W. H., et al. Boxing training for patients with Parkinson disease: a case series. *Physical Therapy*. 2011. Vol. 91. P. 132–142.

3. Doherty D., Felisky P., Morton K., Sumner K. Functional benefits of fitness boxing for survivors diagnosed with breast or ovarian cancer: a pilot study. *Rehabilitation Oncology*. 2020. P. 154–161.

4. Kercher V. M., Kercher K. M., Bennion T., Yates B. Fitness trends from around the globe. *ACSM's Health & Fitness Journal*. 2021.

5. L. S. Mary, B. Laura, B. Kaitlin, J. Olivia. Effects of Tai Chi, fitness boxing, and video activities on the balance and endurance of a participant with multiple sclerosis: a case study. *Activities Adaptation & Aging*. 2018. Vol. 43(1). P. 1–12. [https://ouci.dntb.gov.ua/en/works/7qobRA1l/].

6. Todorova V., Rybalko P., Dubynska O., Khomenko O., Gvozdetska S., Krasilov A., Yevtushenko Y. MMA exercises in physical education of 17–18 year old students. Propósitos y Representaciones: Revista de Psicología Educativa. *Journal of Educational Psychology*. 2021. Vol. 9, SPE(3). P. e116.

7. Ажиппо О. Ю., Мамешина М. А. Оцінка функціонального стану кардіореспіраторної системи учнів основної школи. *Актуальні проблеми фізичного виховання різних верств населення*. Харків: ХДАФК, 2019. С. 15–23.

8. Андрющенко Т. Організаційно-методичні умови застосування засобів скіпінгу у фізичному вихованні старшокласників. *Спортивний вісник Придніпров'я*. 2023. № 3. С. 3–10.

9. Базилевич Н., Юрченко І., Тонконог О. Вплив занять боксом на фізичну підготовленість учнів старшої школи. *Науковий часопис Українського державного університету імені Михайла Драгоманова*. 2023. № 3К (162). С. 48–54.

10. Білов С. О., Тищенко В. О. Сучасний стан і перспективи розвитку плавання в умовах війни та в післявоєнний період. *Фізичне виховання та спорт*. 2023. № 2. С. 39–46.

11. Борисова Ю., Шкарупіло П. Вплив занять капоейрою на фізичну підготовленість і соматичне здоров'я дітей 15–16 років. *Спортивний вісник Придніпров'я*. 2017. № 1. С. 113–117.

12. Дутчак М., Жданова О., Чеховська Л., Чеховська М. Оздоровчий фітнес як підсистема оздоровчо-рекреаційної рухової активності. *Фізична культура, спорт і здоров'я: стан, проблеми та перспективи*. 2019. С. 134–136.

13. Єланська О. О. Вплив засобів карате на психофізичний та духовно-моральний розвиток підлітків. *Фізичне виховання та спорт*. 2023. № 3. С. 16–22.

14. Єфімова В. М. Здоров'язбережувальні технології у контексті педагогічних досліджень. *Педагогіка, психологія та медико-біологічні проблеми фізичного виховання і спорту*. 2010. № 1. С. 57–60.

15. Зінченко В. Б., Усачов Ю. О. Фітнес-технології у фізичному вихованні: навч. посіб. Київ: НАУ, 2011. 151 с.

16. Карабанов Є., Білогур В., Крупіна Л., Кубрак С. Європейський досвід системи фізичного виховання: застосування в Україні. *Вісник Прикарпатського університету. Фізична культура*. 2024. Вип. 42. С. 10–16.

17. Коваленко Ю. О., Дорошенко І. Е. Вплив секційних занять із футболу на фізичний розвиток та функціональний стан старшокласників. *Фізичне виховання та спорт*. С. 33–37.

18. Кравчук Т. М., Сорока О. С. Особливості фізичної підготовленості учнів старших класів державних та приватних освітніх закладів. *Теорія та методика фізичного виховання*. 2014. № 2.

19. Криворучко Н. В., Масляк І. П. Шляхи підвищення фізичного розвитку та фізичної підготовленості молодого покоління. *Науковий часопис НПУ імені М. П. Драгоманова*. Київ, 2016. Вип. 11 (81). С. 57–60.

20. Масляк І. П. Вплив аеробіки силової спрямованості на стан кардіореспіраторної системи школярів старших класів. *Науковий часопис НПУ імені М. П. Драгоманова*. Київ, 2017. Вип. 1 (82). С. 35–38.

21. Масол В. Особливості виховання рішучості старшокласників у процесі занять фізичною культурою. *Науковий часопис Українського державного університету імені Михайла Драгоманова*. 2020. № 5 (125). С. 106–109.

22. Москаленко Н. Створення інноваційної програми розвитку фізкультурно-оздоровчої роботи в ЗОШ. *Спортивний вісник Придніпров'я*. 2005. № 2. С. 37–39.

23. Пащенко Т. М. Самостійність як риса особистості. *Нові технології навчання: науково-методичний збірник*. Київ, 2004. Вип. 36. С. 285–293.

24. Петрова А., Бала Т., Іванова Ю. Вплив вправ кросфіту на показники функціонального стану дихальної системи учнів 16 років. *Актуальні проблеми фізичного виховання різних верств населення*. 2024. С. 47–54.

25. Петрушин Д. В., Хованова Д. О. Травмування під час тренування у спортивній секції з боксу, пов'язане з недостатньою фізичною підготовленістю курсантів. *Єдиноборства*. 2019. С. 81–87.

26. Присяжнюк С. І. Динаміка показників серцево-судинної та дихальної систем під впливом фізичного навантаження школярів загальноосвітньої школи. *Науковий часопис НПУ імені М. П. Драгоманова*. Київ: Вид-во НПУ імені М. П. Драгоманова, 2020. № 3К (123). С. 345–350.

27. Рибачок Р. О., Проценко А. А., Суханова Г. П. Актуальність та перспективи розвитку фітнес-боксу в сучасних умовах функціонування системи оздоровчого фітнесу. *Науковий часопис Українського державного університету імені Михайла Драгоманова*. 2021. № 3 (133). С. 105–112.

28. Сушко Р. О. Рейтингова оцінка популярності видів спорту в країнах із високим рівнем розвитку баскетболу. *Вісник Запорізького національного університету. Фізичне виховання та спорт*. 2015. № 2. С. 78–85.

29. Томащук О., Деделюк Н., Ковальчук Н., Дем'янчук О., Войтович О. Інноваційні підходи до організації фізичного виховання школярів. *Вісник Прикарпатського університету. Фізична культура*. 2024. Вип. 42. С. 31–35.

30. Турчик І. Х. Фізичне виховання і спорт у шкільній освіті Європи: монографія. Дрогобич: Швидкодрук, 2017. 138 с.

31. Яковенко А. Сучасний стан фізичного виховання школярів у європейських країнах. *Вісник Прикарпатського університету. Серія: Фізична культура*. 2019. № 33. С. 125–132.

**Information about the author:**
**Dubynska Oksana Yakivna,**
PhD in Physical Education, Associate Professor, Senior Lecturer at the Department of Theory and Methods of Physical Culture
Sumy State Pedagogical University named after A.S. Makarenko
87 Romenska St, Sumy, 40002, Ukraine