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THE PAIN EMPATHY LEVEL OF ATHLETES

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Keywords: empathy, pain empathy, athletes

Research Objectives. Empathy is the capacity of an individual to experience the emotions of others, understand and recognize the source of such emotions. Pain empathy is a special form of empathy. it is an individual's experience, perceptive, evaluation and response to others' pain. Physical activity can shape individual rich personality qualities that including individual empathy. Previous studies have discussed the empathy level of athletes in different sports [1], but the research is not sufficient, merely this article will be exploring further discussed from other angles. **Methodology.** Using the literature research method, fully search the major databases, collect the literatures on «empathy» or «empathic» and «athletes», analyze the methods and conclusions between them, and also provides some conjectures for the study of brain plasticity by sports. **Findings:** Athletes' pain empathy includes the change of pain sensitivity and the shaping of brain. **Research Outcomes.** Firstly, it may be the relationship between pain sensitivity or pain tolerance and pain empathy. The pain sensitivity of athletes is generally low, or the pain tolerance is high, especially contact sports athletes. However, there was a positive correlation between pain sensitivity and pain empathy, Previous studies [2,3] have found that individuals with low pain sensitivity induced lower brain electrical signals in the confronted of others pain. A preceding review [4] showed that athletes have a high pain tolerance, which will lead to changes in their sense of pain. This may be related to the high overlap of brain areas of pain sense and pain empathy, such as the anterior insula (AI) and mid-cingulate cortex. Secondly, the shaping effect of sports on an individual brain may lead to the change of individual pain empathy level. Physical activity can promote the development of individual empathy-related nervous systems, and Wu et al. [5] summarized the plasticity of some career

experiences to the individual brain, including professional athletes. Experts' players have higher advantages in related brain regions, such as AI and the left inferior frontal gyrus, which partially overlap with empathy-related brain regions. Therefore, the level of empathy of athletes may have changed under the long-term influence of sports. **Future Scope.** To sum up, athletes' pain empathy level under empathy priming may be low, which is related to their professional experience. Over time, there may be a phenomenon of «desensitization» in treating others' pain, which may be based on their deeper discernment of such pain things, and then they may treat this with a more objective attitude. In the future, therefore, the research on the shaping of brain structure by sports based on individual empathy can be carried out through a variety of evaluation tools, such as the EEG, event-related potentials (ERP), MRI, fMRI and so on.

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META ANALYSIS OF THE EFFECT OF EXERGAME ON THE IMPROVEMENT OF COGNITIVE ABILITY IN THE ELDERLY

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Keywords: exergame, elderly, cognitive ability

Objective. Previous studies have shown that Exergame (EX) can improve cognitive function in the elderly [1]. However, compared with traditional physical exercise or other physiotherapy, it is uncertain whether EX can significantly improve the cognitive function of the elderly [2]. Therefore, the main purpose of this study is to systematically review the randomized controlled trials of EX intervention on the improvement of cognitive function of the healthy elderly, and to study the characteristics and effectiveness of the effect of EX on cognitive function of the elderly, to try to update the effect of EX on cognitive function of the elderly, and to discuss the appropriate intervention orientation. **Methods.** Through the search of Web of Science (WOS), PubMed, Scopus, Cochrane Library, EMBASE, Science Direct and China National Knowledge Infrastructure, a total of 2713 articles were retrieved by the deadline of January 2021, and 1518 studies were retained after eliminating repeated literature. After preliminary screening of titles and abstracts, 89 articles were obtained, and 70 studies were excluded after reading the full text. Finally, 19 randomized controlled trials were listed, and the RevMan5.3 software was used to draw the forest map of the included literature. The data types of the outcome indicators of this study were continuous variables, so the statistical data were summarized into the changing average and standard deviation. The average change for each group is calculated by subtracting the baseline value from the final value. **Results.** 9 results of 19 randomized controlled trials were analyzed: executive function (EF), short-term working memory (STWM), global cognition (GC), processing speed

(PS), visual processing (VP), fluid reasoning (FR), cognitive motor-speed (CM-speed), cognitive motor-gait (CM-Gait) and long-term memory and recall (LTSR). When evaluating the effectiveness of EX on cognitive function in the elderly, a comprehensive analysis of interventions showed a significant improvement in EF(SMD=0.84, 95%CI 0.41~1.27, I^2=90%, P<0.00001), STWM(SMD=0.77, 95%CI 0.24~1.30, I^2=90%, P<0.00001), GC(SMD=-0.43, 95%CI 0.60~0.26, I^2=64%, P＜0.00001), PS(SMD=-0.43, 95%CI 0.60~0.26, I^2=64%, P ＜0.00001), VP(SMD=0.51, 95%CI 0.27~0.76, I^2=21%, P=0.28), FR(SMD=1.32, 95%CI 0.30~2.34, I^2=49%, P=0.10), CM-Speed(SMD=-0.44, 95%CI 0.59~0.29,I^2=73%, P=0.02), but there was no significant difference in CM-gait and LTSR tests. There were further significant differences in conversion and inhibition functions between the two subitems of EF (P< 0.00001). Generally speaking, EX has a positive impact on the cognitive ability of the healthy elderly. **Conclusion.** In sum, our study provided that the cognitive functions were improved by EX intervention in the areas of EF, STWM, GC, PS, VP, FR and CM-speed, except CM-gait and LTSR. **Future Scope.** EX promotes sport learning through immediate feedback on behavior and exercise results [3]. It gets the advantages of convenience, entertainment, safety and economy. It has been assumed that a combination of physical training with cognitive stimulation presents a promising training way with better benefits due to several senses [4]. In terms of cognition, we suggest strengthening training in corresponding areas for cognitive improvement; for physical exercise, we propose increasing special physical training, especially lower limb strength training.

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THE ATHLETES' PHYSICAL PERFORMANCE IN EMPATHY PRIMING

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Keywords: empathy, athletes, physical performance

Research Objectives. Empathy gives us the capacity to imitate and realize others' emotions and behaviors, and it can promote individual prosocial behavior and is of great significance to individual survival in society under the right circumstances, but there are costs to being too empathic. Empathy may thus be viewed as a double-edged sword. Therefore, this article will be exploring the influence of empathy on athletes' physical performance. **Methodology.** Using the literature research method, fully search the major databases, collect the literatures on «empathy» and «performance» or «psychophysiological», analyze the methods and conclusions between them, and provide some conjectures for the cross research of sports and psychology. **Findings.** Different priming paradigms can induce individual different core affect, including aversion and fear, and the paradigms that mainly cause individual empathy are similar to their life scenes, especially their movement patterns. **Research Outcomes.** The research of Tice et al. [1] asked subjects to conduct a process of

cognitive resource consumption firstly, then measured their grip performance, randomly divided them into three groups, then asked the three groups of subjects to watch three different emotional videos (happy, neutral and sad) respectively, and then tested their grip performance again, It is found that only the subjects who watch positive emotions have better performance in the grip strength post-test. They investigated that happy emotions are a mean to recover consumed cognitive resources, while negative emotions still consume individual cognitive resources. Astokorki et al. [2] also conducted endurance cycling tasks and the impact of viewing painful images on cycling performance. They conducted continuous riding tests with fixed power and fixed distance for leisure cyclists, and collected physiological and psychological indicators of equidistant nodes (time and distance) and physical performance data during riding, including heart rate, blood lactic acid content, fatigue perception, pain perception and riding power, It was found that in the fixed power test, the pain perception of the group watching negative pictures was significantly higher than that of the other two groups, and the riding power was significantly lower than that of the other two groups; In the fixed distance riding test, with the increase of riding distance, the accumulation of blood lactic acid in the negative picture group was significantly higher than that in the other two groups, and the heart rate was significantly lower than that in the other two groups. The relationship between empathy and physical performance is also discussed in a review [3]. The reason why empathy affects motor performance is (mirror neuron system, MNS) and load competition hypothesis. **Future Scope.** It may be the case that the process of empathy is a consumption process of cognitive resources, and the consumption of cognitive resources will affect physical performance [4]. Therefore, after the priming of empathy, whether the regulation of the empathy process and the subsequent behavior of athletes of different types of events have a significant impact still needs further research.

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A META-ANALYSIS OF THE EFFECTS OF EXERCISE INTERVENTION ON POSTURE CONTROL IN THE ELDERLY

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Keywords: exercise intervention, elderly, posture control

Objective. Exercise is a key intervention to improve physical function. Some studies have shown that exercise intervention has a positive effect on the posture control ability of the elderly, and targeted intervention measures are of great significance to the posture control of the elderly [1]. However, there is a relative lack of detailed description of different intervention methods and the number of research samples. Under this background, this paper uses meta analysis method to analyze different exercise intervention methods to quantitatively analyze the research literature on attitude control of the elderly, and looks forward to providing theoretical basis and practical scheme for the selection of exercise intervention methods to improve the attitude control ability of the elderly. **Methods.** Databases such as Elsevier, SCI-E and China national knowledge network were searched to collect experiments on the influence of different exercise

interventions on posture control and fall prevention in the elderly. The quality of the literature was evaluated. The RevMan 5.3 software was used for statistical analysis, and the ratio ratio and 95% confidence interval were used as the effect indicators to compare the effects of training methods and programs on posture control in the elderly. **Results.** 23 control trials and 3979 experimental samples were included. The subjects were all aged 65 and above; all included in the literature included one or more exercise intervention methods, the main training methods were tai chi training, resistance training, balance training and comprehensive training, among which the comprehensive training was the combination of aerobic training and resistance training. The results of meta-analysis showed that different exercise intervention methods improved gait, knee and ankle strength, and standing on one foot in the elderly, and the effect was significant ($P<0.05$). **Conclusion.** Different kinds of exercise intervention have significant effect on the postural control ability of the elderly. Scientific formulation of training intensity, interval time for the elderly training effect is very important. Based on the existing research defects, the conclusions need to be confirmed by more high-quality controlled trials. **Future Scope.** Different training methods can bring better balance, stable walking and fall prevention for the elderly [3]. Therefore, trainers can choose more suitable training methods according to the actual situation of the elderly to bring a good living environment for the elderly [4]. More high-quality exercise intervention studies on postural control of the elderly and more scientific and objective outcome indicators are needed to consolidate and expand the results of this meta analysis. It is suggested that future studies should focus on the actual situation of the elderly. As the total time of the experiment is from 6 weeks to 12 months, it is necessary to further determine the scientific training plan, such as intensity, time, times, load, training structure and so on. All in all, the results of this study support exercise intervention 2-3 times a week for 3 months as a training strategy to improve the postural control ability of the elderly and prevent falls.

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META-ANALYSIS OF THE EFFECTIVENESS OF TAICHI ON THE IMPROVEMENT OF MOTOR AND BALANCE CAPACITY IN PARKINSON'S DISEASE PATIENTS

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Keywords: Parkinson’s disease, Taichi, balance

Research Objectives. This systematic review and meta-analysis studied the effectiveness of Tai Chi (TC) on Parkinson’s disease (PD) patients with the capacity of motor and balance function. **Methodology.** A search was performed on the electronic databases, including web of science, Pubmed, China National Knowledge Infrastructure, Wangfang and VIP, and from the self-built database to June 2020, Randomized controlled study (RCTs) of TC intervention on PD patients was collected. 2 researchers independently screened the literatures, extracted the data and evaluated the quality of the

literatures, and then RevMan5.3 software was used for meta-analysis. Search terms were «Parkinson's disease», «Taiji», «balance», «motor». **Findings.** Finally, 409 literatures were included, and 22 RCTs were included in the analysis. Outcome indicators including the Berg Balance Scale (BBS), functional reach test (FRT), Timed Up and Go Test (TUG), UPDRS-III, One-leg standing test (OLS), 6m walking test(6MWT). **Research Outcomes.** Compared with the control group, the UPDRS-III, TUG, BBS, FRT, and OLS in the TC group have significant effectiveness, but the 6MWT need further research and discussion. **Future Scope.** TC intervention can significantly improve most of the exercise and balance functions of PD patients, because when practicing TC, individuals need to maintain different postures, including many movements form, slow weight transfer, body rotation, standing on one leg in different positions, and need subtle joint control and muscle coordination [1]. When the human body balances under difficult or unsafe posture conditions, the sensitivity of the muscle spindle will increase [2], and the main kinesthetic sensor muscle spindle is particularly sensitive in detecting the change of muscle length and muscle contraction speed to sense the position and movement of limbs [3]. However, this review still needs further precise forms of TC intervention, because different forms of TC have different movement contents, including 24-form TC, 8-form TC and Chen Style TC, which have different effects on individual balance improvement.

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RESEARCH ON APPLICATION OF TABLE TENNIS AUXILIARY TRAINING SYSTEM IN CULTIVATING CAMPUS RESERVE TALENTS

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Keywords: table tennis; auxiliary training; reserve talent training

Introduction. In order to improve the popularization of campus table tennis, and lay a foundation for its development, enrich the content of teaching and training activities, and strengthen the teaching and training of physical education classes, campus table tennis teaching is a form of sports after the new curriculum reform. It is imminent for all primary and secondary schools to carry out a comprehensive reform of table tennis teaching. Table tennis, as the pioneer of Chinese competitive sports, shoulders more important responsibilities in the new historical period. How to reflect 'sports return to education', to integrate sports and education deeply, to realize the concept of cultivating people with morality and through sports, and to solve the problems of young people's physical health and the training of reserve talents has become a problem of common concern and urgent solution. **Method.** The documentary method and expert interview method are used to determine the preliminary framework. Using the questionnaire survey method, and stratified sampling method, designing corresponding questionnaires to conduct field visits to relevant key areas and schools to understand the local table tennis teaching needs. **Results.** The «Table Tennis Auxiliary Training System» designed through five rounds of expert questionnaires specifically includes three parts: technical teaching, technical training, and performance assessment. Combined with the satisfaction questionnaire survey of 501 school-age students, it is found that the students' experience, satisfaction and learning status of the table tennis teaching auxiliary training system are relatively ideal, ranging from average to satisfactory, and more inclined to be satisfied. Through the comparison of the differences between different types of students, it is found that there are no significant differences in skills mastery, satisfaction status and place attachment status of students of different

genders and different ages after learning this system. **Conclusion.** The table tennis auxiliary training system integrates teaching, practice and assessment. It can improve the application benefits of the popularization of table tennis on campus. The intelligent management and visual presentation of large quantities of data provide great convenience for the development of reserve talent training. And it is basically derived from the daily physical education teaching of students of different ages. Under the complementarity of quantitative and qualitative evaluation, the testes can be evaluated comprehensively, and the ITTF's current amateur table tennis level test method has improved the ease of evaluation of teaching and learning effects. **Future field.** The auxiliary table tennis training system can effectively solve the problems of 'poor effect' and "small amount of classroom training" existing in table tennis teaching, and can better realize the cultivation of reserve talents for campus table tennis development and enrich training contents. Strengthen the purpose of teaching and training in class. Making the training environment closely match the actual teacher's teaching and combine teachings and exercises. Teaching students in accordance with their aptitude, and improving the teachers' efficiency.

RESEARCH ON PE CURRICULUM REFORM BASED ON THE MODE OF «INTEGRATION OF REASON AND REALITY»

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Keywords: «integration of truth and reality» mode, physical education teaching theory, the curriculum reform

Research shows that need is the comprehensive development of future school, and has a solid knowledge reserves and solid professional skills education talents [1]. Principle of real integration teaching is the current colleges and universities to explore a new mode of teaching,

between theory and practice of its breakthrough in traditional teaching, the teaching link relatively concentrated, so that the students can quickly adapt to the requirement of actual jobs in the future [2]. The teaching model has been applied in many majors such as information management, numerical control and accounting, but there are few researches on physical education [3]. **Purpose.** Based on the reform and exploration of the practical teaching links of physical education major, this study carried out a research on the teaching mode of the integration of reason and reality in the course teaching. By analyzing and comparing the effects of the two modes of traditional teaching and reform teaching, it further confirmed the effectiveness of the teaching reform of the integration of reason and reality. **Methods.** In this study, the key words of sports, Education, integration, reasonable and practical physical Education were adopted through ERIC International ERIC ProQuest(R) Education of CNKI Literature retrieval is conducted in Journals and other databases to provide reliable theoretical basis for in-depth research in this paper. In addition, The Analytic Hierarchy is adopted to analyze The status quo of physical education teaching course development and students' subjective evaluation of curriculum teaching reform through interview and questionnaire survey Process, AHP) inductive analysis of several indicators in the teaching Process, as the basis of effect evaluation, teaching effect as the decision-making goal. The development of students' teaching resources, the three indicators that affect the teaching effect as the intermediate element layer, students' praise, theoretical knowledge, professional skills, learning enthusiasm recognition degree as the indicators of the above intermediate elements, the teaching effects under different teaching modes are evaluated by calculating weights and item assignment. **Results.** According to the two different index score compared to establish judgment matrix and consistency inspection, calculated the weight of new teaching mode effect has improved 10.65%, compared with other teaching mode of teaching effect is considerably improved. Therefore, this kind of teaching mode in the current teaching environment of promoting significance. **Conclusion.** In order to adapt to the background of the new era, we should actively promote the teaching mode of integrating physical education theory teaching and practical teaching, rebuild the curriculum content system with practical

experience as the core, so that students can accumulate knowledge and improve their practical ability. This study shows that the integration of reason and reality in physical education should be realized The reform of teaching mode can better promote the all-round development of students and cultivate excellent reserve talents for the cause of physical education. **Future Scope.** The teaching mode of «combination of truth and practice» has achieved phased results in the training of sports talents. Future research should focus more on the reform measures of specific sports courses and create important communication value for the development of the whole sports teaching.

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EFFECTS OF EXERCISE ON BRAIN PLASTICITY: EVIDENCE BASED ON FUNCTIONAL MAGNATIC RESONANCE IMAGING

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Key words: brain plasticity, functional magnatic resonance

Background. Brain has plasticity, the synapses, neurons and other physiological structures and functions of the brain will change with the internal and external environment. The brain not only shows developmental plasticity when it is immature, but also has certain plasticity still after maturity [1]. Many factors affect the function of the brain, and widely attention has been attracted by the positive benefits of exercise on brain plasticity. In recent years, a large number of studies have shown that exercise has a positive effect on brain function. However, it is not clear whether different exercise styles and duration have different effects on the brain. Functional magnetic resonance imaging (functional magnatic resonance imaging, fMRI) obtain the functional information of neural activity based on the changes of blood flow and metabolism produced by neural activity, and observe the structure and function of the brain, which provides the basis and possibility for the study of the neuroplasticity of the human body [2]. **Purpose.** The purpose of this paper is to sort out the research results of exercise on brain plasticity in recent years, and to explore the effects of different exercise modes on brain plasticity from the perspective of fMRI. **Methods.** In this paper, by searching Pubmed, Web of Science, EBSCO, CNKI and other databases, the literatures are searched with the keywords of «functional magnatic resonance imaging», «brain plasticity», «exercise» and «brain plasticity». **Results.** The main results are as follows: 1) Long-term training can specifically change the relevant brain volume through the use of plasticity-dependent, and acute and long-term exercise can affect changes in brain function. 2) Compared with the novice who mainly activated the frontal lobe network, Long-term training were more able to activate the motor area, occipital-temporal lobe and movement

observation network during the task, and performed better in both conventional and sports-related cognitive tasks. 3) Closed motor skills events such as marathons, dances and gymnastics, showed less brain volume and weaker brain activation in the brain regions associated with visual space and language tasks and movement execution. The improvement of high-level athletes by reducing brain volume and weakening the activation of brain regions may be a unique sign of closed motor skills. **Conclusion.** 1) Long-term exercise (different items) has specific use-dependent changes on brain plasticity, and acute exercise can also affect brain plasticity in some ways. 2) exercise improves the cognitive function of the brain, and promotes working memory, perception, execution and control. 3) aerobic exercise can promote the change of excitability of cerebral cortex, and long-term aerobic exercise can improve cognitive and memory function. 4) the improvement of brain plasticity by exercise is related to the changes of cerebral blood flow and neurotransmitters.

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PHYSICAL REHABILITATION AND RECREATION IN THE FORESTS OF SIBERIA

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Keywords: rehabilitation, recreation, forests

Health, as you know, is an invaluable condition not only for each person, but also for the whole society as a whole. Nevertheless, it is

reasonably maintained and strengthened by the individual and society, provides him with an active and long-term life. **Purpose of the work.** Analysis and methods of rehabilitation and recreation in the coniferous forests of Siberia. **Tasks.** The influence of coniferous forests on the rehabilitation and recreation of the human body. It is known that huge arrays of coniferous forests grow in the Northern hemisphere of our earth. In the Siberian forests, conifers are about 70%, a popular type of tree, pine. Conifers are characterized not only by rapid growth and the longest life expectancy, but also by their healing properties. Due to the unique ability to purify the air, pine plantations are rightfully called the «lungs of the planet». According to the results of a number of environmental studies, there are about 500 microbes in 1 cubic meter of air in a pine forest, while in the city with a similar measurement, this figure exceeds 35 thousand. Needles secrete active volatile compounds with bactericidal properties, as well as coniferous trees secrete volatile substances, phytoncides, which disinfect the air, and make it practically clean and harmless to sick or weakened lungs. Phytoncides have a positive effect on the epithelium of the mucous membranes of the respiratory tract and the tone of the muscles of the bronchi, as well as improves hematopoietic and cardiac activity, normalizes the nervous system, which is extremely necessary for recreation and full rehabilitation of a person. Thus, we can say with full confidence that a person who receives more pure oxygen with "full lungs" is an emotionally and psychologically correct person who is ready to build, sometimes, a difficult life correctly. On the eve of the epidemic of coronavirus infection, where the virus affects the lungs in 80%, thereby disrupting the work of not only the human respiratory system, but also other vital organs. Where humanity still does not know a medicine that would cure people, and those drugs that are used today help to a greater extent, then fast and unhindered rehabilitation after a disease is still relevant. Rehabilitation in coniferous forests is more relevant than ever for people who have suffered a coronavirus infection. For someone it will be an active or passive walk, for someone it will be a serious rehabilitation, then it should be done outdoors, it is better if it is a coniferous forest. **Conclusion.** Rehabilitation of the human body will be more effective in coniferous forests, since the positive effect of phytoncides and volatile coniferous oils affect the somatic and psycho-emotional state of a person, which

means that a person's breathing will be stable and a person will be happy.

MODERN RESPIRATORY HEALTH SYSTEMS, THEIR PLACE IN THE FORMATION OF A HEALTHY LIFESTYLE

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Keywords: breath, health, gymnastics

The conditions of modern life, characterized by an increase in the pace of life and emotional overload, hypokinesia and an increase in environmental tension, an increase in the number of stressful situations of various types, do not contribute to health at all. Breathing accompanies a person from the first breath of a newborn to the last. With the help of breathing, you can influence the state of the central nervous system (CNS), the state of the heart and blood vessels, metabolic processes, abdominal organs. By controlling the process of external respiration, you can come close to mastering the ability to independently manage your own condition, the work of various organs and systems, influence the course of various pathological processes, contribute to the study of diseases and their active prevention.

THE IMPACT OF COVID-19 ON PEOPLE'S PHYSICAL ACTIVITY

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Keywords: sport, physical activity, COVID-19

Sport has always been an essential part of a healthy lifestyle. However, the last couple of years have seen a sudden decline in physical activity. The COVID-19 pandemic has changed the ordinary way of living forever. The **research objectives** are to determine the effect of the COVID-19 on people's physical activity, to explain what are the consequences of the pandemic, and make recommendations on

recovery. Due to the COVID-19, the opportunities for people to be physically active were significantly reduced, especially due to the limitation of activities. Moreover, it contributed to increasing sedentary lifestyles for long periods, which harmed people's physical and mental health and their lives in general. The **research outcomes** have revealed that COVID-19 leads to physical, psychological, and functional decline, which arises from a long-term period of inactivity. Obviously, the main priority, for now, is protecting and strengthening people's health. The damage caused by coronavirus varies from person to person depending on the immune system and the general condition of the body. More and more cases are confirmed that even if the infection is cured, the overall condition does not improve. It may cause a tendency for increased thrombosis, impaired sense of smell, sleep troubles, and other serious health issues. Many COVID-19 patients develop respiratory failure. Even strong and formerly healthy people complain of shortness of breath, severe weakness, heart rhythm disorders, and neurological pain. About 90% of survivors of COVID-19 experience a decrease in lung volume. They all need rehabilitation, which is physically demanding for people affected by COVID-19. COVID-19 poses a significant risk because of its unpredictability. For many people, the consequences of the disease proved a serious obstacle to getting back to normal life and resuming workouts. Even physically trained people experience an energy collapse after COVID-19 and are unable to give their bodies the kind of exercise they were used to immediately after the illness. Recovery from Covid-19 is a set of measures to put the body system that has been affected by the COVID-19 infection in order. One significant finding from this research is that the approach to recovery after the disease must be comprehensive, competent, and personalized. After all, it is as important to cope with the disease to recover from it. Physical training and breathing exercises can help to restore breathing function. It is essential to practice respiratory exercises, take walks and do quite a moderate physical exertion. Concerning the **future scope**, the physical consequences of COVID-19 may have a detrimental effect on our healthcare system for many years to come. The focus should be set on both strength and aerobic exercises. The main recommendation is to start training at a lower strength and gradually increase the intensity. Just taking a short break from sitting, by doing light physical

movements, such as walking or stretching, can help improve blood circulation and muscle activity. It is important to remember that any form of activity is beneficial, and even the easier-looking exercises will have a positive impact on one's health.

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TRAIL RUNNING AS RECREATION: BACKGROUND

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Introduction. Nowadays, non-traditional types of physical activity are becoming more popular (for example, cycling, zorbing or sand surfing). So, among the running disciplines, mountain running, skyrunning, trail running, and frost running can be distinguished. **Research objective.** The aim of this article to review the prerequisites for the use of trail running as a type of physical recreation for various categories of the population. **Methodology.** To achieve this goal, methods of theoretical analysis of scientific and methodological literature and media data were used, as well as generalization of the results obtained. **Research Outcomes.** We identified the main prerequisites for using trail running as a type of physical recreation – biological, social, psychological, educational, cultural, and economical. These prerequisites fully reflect various subject areas of

recreational activity. As *biological prerequisites*, some features of physical work performed during trail training can be distinguished. In addition to the usual structure of movement, the load is always aerobic in nature, and throughout the entire distance, variable work is realized due to the encountered descents and ascents. All this has a positive effect on the work of the cardiovascular and respiratory systems. At the same time, training is held in natural conditions, which provides an effective combination of the main means of physical recreation – exercises and natural factors. So, the *psychological prerequisites* are due to the peculiarities of the organization and conduct of training, races and trail running competitions. At the same time, in trail running competitions, the one who can quickly assess the situation and make the right decision has an advantage A distinctive feature of trail lovers is not only motivation for high results in races and official competitions, but also «overcoming oneself» at a distance (to reach the finish line), and in the future – an increase in personal results. *The educational effect* of trail running is associated with the expansion of the motor and cognitive abilities of the trainees, the actualization of their physical capabilities. A positive attitude of a person to the need for a healthy lifestyle is formed, as well as the need for constant physical activity. *Cultural prerequisites* for the use of trail running as a type of physical recreation are expressed in the proximity of a person to nature during classes. A person learns to protect the place in which he is, the value of order and harmony in nature increases for him. *Economical prerequisites* include simplicity and affordability of trail running. Trail running is a type of physical activity that does not depend on the weather or season but requires only the presence of the natural environment. **Findings.** The considered prerequisites for the use of trail running for the purpose of recreation (biological, social, psychological, educational, cultural, and economical) reflect various subject areas of recreational activity. Trail training have a positive impact on the human body, psyche, socialization in society, creativity, and culture. Thus, trail running can be used as a physical recreation for all categories of the population, and its economic accessibility allows it to be done in all regions of the Russian Federation.

ANALYSIS OF BREAKING ATHLETE'S HANDSTAND MOVEMENT INVOLVING MUSCLES BASED ON SURFACE ELECTROMYOGRAPHY TECHNOLOGY

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Keywords: handstand, breaking, electromyography, EMG signal

Research objective. To analyze the differences of surface EMG signals on different muscles of breaking college athletes during handstand, and to explore the performance of muscle work during handstand. **Methodology.** Twelve breaking college athletes were selected as study subjects, with an age of 21 ± 5 years, height 176 ± 6 cm and weight 66 ± 9 kg. Each subject was required to perform handstand, and Noraxon surface electromyography instrument was used to measure the surface EMG signal of the posterior deltoid muscle, pectoralis major, and latissimus dorsi, rectus abdominis, external oblique muscles, biceps, triceps, and deltoid anterior bundles during handstand. The EMG signal was analyzed by EMG signal analysis software MR3 and MATLAB. The percentage of athlete's upper-limb muscle work, average and standard deviation were calculated to judge the muscle work during handstand. **Findings.** When the breaking dancer completes the handstand, the work of the upper body muscles is as follows: triceps brachii, posterior deltoid bundle, rectus abdominis, anterior deltoid bundle, pectoralis major, latissimus dorsi, external oblique abdominal muscle and biceps brachii. **Research Outcomes.** Breaking college athletes all upper body muscles are indispensable for breaking athlete's handstand. Among them, the triceps and deltoids do obvious work. The triceps brachii is the main muscle group of the upper arm, which plays an important role in the quality of the movement. The deltoid muscle is required to have strong strength to stabilize the body and the support of the arms when completing the handstand. **Future Scope.** With breaking in the street dance sport officially included in the 2024 Paris Olympic Games by the International Olympic Committee, it is more important to provide standardized guidance and training on the basic movements involved in breaking.

HOME-BASED EXERCISE THERAPY – A KEY TO RECOVER FROM COVID-19

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COVID-19 is a widespread disease. Even though there are patients with mild forms of COVID-19 and they can recover in a short period. Nevertheless, patients with severe or critical forms need to do extra procedures to dispose of long-term consequences. This article analyzes the scientific work and recommendations of research institutes, the World Health Organization (WHO), and examines the materials from Internet sources. In the course of the research, possible exercise options and advice on how to do it were named and presented to get rid of and reduce the after-effects. According to the research, the prescriptions of doctors to physical activity are basic exercises to strengthen and restore the work of muscles and the respiratory system. Over the past years, the world has been engulfed in many serious negative situations. New viruses are constantly appearing on the planet. One of which is the new coronavirus COVID-19 infection. And, unfortunately, no one is safe from this infection and its unappreciated negative impact on people`s health. **The study aims** of the article are to find out what basic physical exercises contribute to the recovery of the physiological systems of a person who has had a coronavirus infection. In the research process, the scientific data of WHO and Internet resources were examined. When a patient who has undergone a coronavirus is discharged from the hospital or no longer needs to be under close medical supervision, one needs to continue his self-reliant recovery. So, we can talk about home-based pulmonary rehabilitation. It is a program of exercises that include both breathing exercises and muscle strengthening [4]. Your home-based activity should start with the warm-up. It is essential to prevent injury and prepare the body for physical activity. The duration of the warm-up is 5-7 minutes. If a person feels shortness of breath, then this is a natural symptom after an illness. Warm-up exercises can be done while sitting or standing [3]. The awareness that the majority of Covid-19 survivors

had significantly lower scores on the 6-minute walk test. Thus, marching on the spot is the solution. You can lean on the back of a chair or any other stable surface as needed and then raise your knees one at a time [2]. If you cannot walk very far before needing to sit down, you can do step-ups. All one needs is the bottom step of your flight of stairs. The next group of exercises is strengthening. They will help improve muscles that have become weaker as a result of your illness. Alternatively, of making you feel breathless, your muscles will feel like they have worked hard. Appropriate attention should be paid to breathing exercises. The muscles that help you breathe need to be strengthened as you recover from your lung infection. Breathing through the nose encourages the nervous system to relax and heal itself, whereas deep breathing restores lung function using the diaphragm. The final step of the training is cool-down exercises. They allow your body to return to normal before the exercise stop. Your cool-down should last approximately 5 minutes [3]. A scientific group researched to confirm the effectiveness of these home-based exercise complexes. The experiment showed that the group doing only breathing exercises had minimal health improvements. People from another group did both breathing exercises and aerobic. They have positive dynamics in the work of the cardiovascular and respiratory systems [1]. According to the study results, we can say that home-based exercise therapy can be just as effective as an in-person hospital-based program. However, it is essential to remember that the way you take it varies from person to person. If you are unsure about your participation in exercise, it is better to speak with your physician.

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THE EFFECT OF COLD WATER IMMERSION POST-EXERCISE ON FATIGUE RECOVERY AND EXERCISE PERFORMANCE

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Keywords: temperature, exercise, training

Introduction. Athletes will cause physiological disorders such as muscle damage, hyperthermia, dehydration, and glycogen depletion after long-term, high-intensity exercise training. If the athlete does not relax in time, fully and reasonably after the sports training, it will have an adverse effect on the subsequent training or competition performance [1], and in severe cases, it will also affect the athlete's physical health [2]. At present, cold water immersion (CWI) is more popular in the training and competition of athletes, not only because of the low cost of this technique, but also because CWI can effectively relieve muscle soreness after exercise, eliminate fatigue, and restore exercise performance. CWI is the immersion of a certain part of the body in water <15°C [3]. Studies have suggested that immersion in water with a water temperature of 11 to 15°C for 11 to 15 minutes can effectively mediate and delay muscle soreness caused by exercise [4]. **Research objective.** The aim of this article is to review the effects of CWI post-exercise on fatigue recovery and exercise performance. **Methodology.** Mainly use the literature method, with «cold water immersion», «performance after cold water immersion», «fatigue recovery after cold water immersion» as keywords, search for related articles on academic websites. **Research Outcomes.** Research suggests that CWI after exercise can accelerate the body’s fatigue recovery, and the relevant mechanism is not yet clear. In short-term fatigue recovery, most studies believe that CWI can improve hyperthermia and central nervous system-mediated fatigue and reduce

cardiovascular stress by increasing the amount of blood returned to the heart, thereby helping fatigue recovery. A few studies believe that CWI leads to skin vasoconstriction combined with the action of hydrostatic pressure further accelerates the elimination of metabolic by-products produced during muscle exercise. As for the long-term fatigue recovery mechanism, CWI is believed to directly reduce delayed muscle soreness, or indirectly reduce delayed muscle soreness by reducing muscle edema and inflammation. The performance of sustained and intense endurance exercise immediately after a relatively short CWI is significantly enhanced, compared with passive rest or active rest under normal temperature [5]or in a hot environment [6]. Compared with passive rest, CWI 5 to 10 minutes immediately after exercise can improve subsequent high-intensity intermittent exercise performance [7]. However, it is necessary to warm up after the CWI and before the next exercise because CWI may cause an excessive drop in muscle temperature and weaken the subsequent exercise performance. **Findings.** The results show that CWI can improve central nervous system fatigue and reduce cardiovascular pressure by reducing hyperthermia caused by exercise and increasing return blood volume, thereby accelerating fatigue recovery after exercise and weakening delayed-onset muscle soreness. At the same time, CWI can improve subsequent exercise performance, but it needs to be warmed up after CWI and before exercise. **Future Scope.** At present, the mechanism of how CWI can help fatigue recovery after exercise is not completely clear. Therefore, this will be a topic that the academic community needs to discuss in the future.

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FEATURES OF THE ORGANIZATION OF PHYSICAL EDUCATION CLASSES WITH PRESCHOOL CHILDREN WITH DOWN SYNDROME

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Keywords: Down syndrome, preschool children, physical education

According to one of the largest charitable foundations «Downside Up», about 2,500 special children with Down syndrome are born in Russia every year. Educators and teachers of institutions that differ in the specifics of their work need to have basic knowledge of working with such special children. In this way, these statistics became the basis for the creation of our article. In our study, we analyzed the scientific literature and the pedagogical past of different schools that affect the organization of physical education classes for children with Down syndrome. **The purpose of the article** is to study the features of physical and sports education for children with Down syndrome. **The object of study** is preschool children with a feature expressed in Down syndrome. **The subject** of this theoretical study is the features of physical culture and sports classes with preschoolers with Down

syndrome. **The research methods** used in writing the article are the study, generalization and theoretical analysis of scientific and methodological literature, pedagogical observation. As a rule, people with Down syndrome have a specific appearance. There are: congenital mental retardation, low birth weight, small height, small limbs (disproportionate to the trunk), short neck, wide hands and feet. Special sports and wellness programs prevent the progression of some diseases in the child's body [1]. A physical education teacher should carry out such activities with special children with Down syndrome: movement correction; development and improvement of coordination in space; development of elementary physical qualities; formation of the child's culture and personality; prevention of congenital diseases. During the lesson, the child should develop as a person. A special form of training will be individual [2]. According to our pedagogical observations, depending on the characteristics of the syndrome, preschool children can successfully master different levels and programs of physical education. Pupils with mild forms of mental retardation are able to study according to the program of general developmental preschool education. The limited health opportunities of children with Down syndrome do not limit the range and variability of the directions of work on their physical education. So, they are widely used: therapeutic physical culture; elements of individual sports, for example, gymnastics, dancing; comprehensive health training, etc.; classes with the use of musical means of influencing and enriching th impressions of the child. [3] Based on the scientific literature sources studied by us, we can conclude the following: a teacher needs professional academic training in the field of physical, inclusive education, as well as knowledge of applied and additional sciences and disciplines to carry out work on the physical development of preschoolers with disabilities, in particular with Down syndrome. Speaking about working with children, it is impossible not to say about the personal interest of the teacher in the profession, without love for children and the desire to raise new generations, it is impossible to achieve the necessary results and goals of the educational process. Areas of work with special children should develop and progress in the same way as with ordinary children, because all children are different, but all children are equal.

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RESEARCH ON THE RELATIONSHIP BETWEEN PROFESSIONAL FOOTBALL PLAYER'S WINTER VACATION AND THEIR INJURIES

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Keywords: winter vacation, football injury, soccer injury

Introduction. Football is called «the world's number one sport». As the training and competition of football players become more and more onerous, various sports injuries frequently affect the players. Minor injuries will bring pain to players and affect their health, while heavier injuries will encroach on athletes' training and game time, and even end their sports career. Some leagues advocate winter vacations to reduce the occurrence of athletes' injuries. The relationship between sports injuries and winter vacations needs to be clarified urgently. **Research objective.** To analyze the relationship between professional football players' winter vacation and sports injuries. **Methodology.** Use the literature method to search in the PubMed, Elsevier, Web of Science and other databases with «football injury» AND «winter», «soccer injury» AND «winter» as keywords, and analyze and summarize related articles. **Research Outcomes.** The sports injuries of professional players have seasonal characteristics. Krutsch et al.[1] conducted a four-season epidemiological study on the frequency of

different types of serious football injuries and the recovery time of professional players in the German Football League. They found that some serious injuries have seasonal characteristics. In the cold winter, the incidence of plantar pain and knee joint pain caused by overuse and fatigue is higher, and the injury rate of hamstrings in the middle of the season is also on the rise. Ekstrand et al.[2] analyzed 56 professional teams from 15 different European countries for 7 consecutive seasons and found that teams without a winter break are more frequently injured than those with a winter break (+2.1 serious injuries per season). Karen et al.[3] found that after the winter vacation time is shortened, the incidence of ankle sprains and knee ligament injuries in German Football League players is higher, and in January of the season, the overall risk of injuries in team training and games increases. Another study showed that after extending the winter vacation, the sports injury rate during the season decreased by 21.1%, mainly due to the significant reduction in the winter injury rate[4]. Although winter vacations may be a preventive measure for professional players' sports injuries, longer vacations can also affect the skill level of players. Research by Jamil et al.[5] showed that the mid-season winter vacation had a negative impact on the technical performance of professional football players in the Bundesliga and Ligue 1 leagues. The stability and accuracy of the player's shooting and passing are deviated, and the longer the winter vacation time, the greater the decline in technical level. **Findings.** Arranging winter vacations in the middle of the season is a preventive measure for sports injuries and can reduce the incidence of injuries. **Future Scope.** Professional football players should reduce the schedule of matches when the weather is not perfect; in cold winters, winter vacations should be appropriately extended to reduce the incidence of sports injuries.

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