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Comparative analysis of the level of physical fitness of students in technical and humanities specialities

Igor Taranets*

Lecturer
Pavlo Tychyna Uman State Pedagogical University
20304, 26 Sadova Str., Uman, Ukraine
https://orcid.org/0009-0001-6332-573X

Vitaliy Syvoldayev

Lecturer
Pavlo Tychyna Uman State Pedagogical University
20304, 26 Sadova Str., Uman, Ukraine
https://orcid.org/0009-0001-5675-0754

Abstract. The study aimed to compare the physical fitness levels of students majoring in technical and humanities subjects based on the author's model of comprehensive training in higher education institutions. The methodology included developing the author's model, an experiment conducted from 3 February to 31 March 2025 at the Sports Complex of Pavlo Tychyna Uman State Pedagogical University, in which 150 students participated, and the formulation of recommendations. The results showed that the implemented programme led to statistically significant positive changes in all key indicators. Aerobic endurance of humanities students increased from 1,200 to 1,400 m (+16.7%), technical students from 1,600 to 2,200 m (+37.5%); strength endurance in "twists" increased from 18 to 25 repetitions (+38.9%) and from 20 to 30 repetitions (+50%); number of push-ups increased from 12 to 18 (+50%) and from 15 to 22 (+46.7%). Explosive strength indicators improved from 185 to 205 cm in humanities students and from 190 to 220 cm in the technical group. Flexibility according to the test increased by 6 cm (18→24 cm) and 9 cm (19→28 cm), respectively. According to the questionnaire, the percentage of students with a high level of psycho-emotional well-being after the programme increased to 44% in the humanities group and to 50% in the technical group, which indicates the positive impact of physical activity on subjective psychological state. The results obtained indicate that a comprehensive training model can improve the physical fitness and psychological well-being of students even with limited intervention duration. The results of the study can be used by physical education teachers, student club coaches, and university administrators to optimise curricula, as well as by specialists in the field of sports pedagogy and health-improving physical culture to develop programmes to increase physical activity among young people

Keywords: structural model; training complex; psychophysical state; aerobic exercise; functional exercises

Introduction

The research relevance of physical fitness among students is determined by the direct impact on overall health, productivity, and the ability to effectively learn academic material. Students of technical and humanities majors face different conditions in the organisation of the educational process and opportunities for physical activity, which creates unequal conditions for the development of physical qualities. A comparative analysis of the physical fitness of different specialities identified characteristic differences between student groups, determine the key factors that influence the level of physical activity, and outline ways to optimise training and educational programmes. Analysis of these aspects contributes to the development of effective methods for forming a healthy lifestyle, increasing physical performance and overall vitality of students of different specialities.

The physical fitness of students in technical and humanities majors was studied using various assessment methods and incorporating social, academic, and organisational factors. A range of researchers have studied this topic by comparing the physical fitness of students from different majors and identifying the factors that influenced

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*Corresponding author

their fitness levels. For example, H. Athaya *et al.* (2023) conducted a comparative analysis of the physical fitness of students with different social statuses and found that social conditions affect overall endurance and strength indicators. Social status affects students' physical fitness through access to sports resources and training opportunities, which determines their endurance and strength indicators. A.A. Bahattab *et al.* (2021) reviewed sports education and training programmes and found that the level of physical fitness of students depends on the specifics of the curriculum and practical classes. Humanities students can develop general endurance through active participation in emergency simulation training, while technical students focus on theoretical training, which limits their physical activity and endurance development.

The introduction of innovative technologies in the vocational education of Ukrainian students during the war was described by H.V. Bilavych *et al.* (2025), incorporating elements of physical training to support health. The tools include online platforms for remote training, mobile applications for tracking physical activity, and virtual trainers that students use for regular exercise, load control, and physical health maintenance during the war. G.F. Deak *et al.* (2025) clustered physical education students in Romania and Ukraine based on level of physical fitness and showed that students in the humanities demonstrate a more even distribution of physical indicators, while technical majors had greater fluctuations between strength, speed, and flexibility. This is due to differences in the curriculum and ways of engaging students in practical physical activity, with humanities majors integrating more physical exercise and technical majors focusing on theoretical training. M. Manzoor *et al.* (2024) compared the physical activity of students from different majors and found that physical education students have higher endurance, strength, and coordination, while humanities students are more likely to engage in low-intensity activities. The study confirmed the influence of the specifics of the curriculum and class schedule on the development of physical fitness. The level of physical fitness of students with and without training opportunities was analysed by J. Martins *et al.* (2023) analysed the physical fitness levels of students with and without training opportunities and found that the level of physical activity of students depends on the curriculum, the number of hours of physical education classes, and the organisation of practical classes, and therefore there are significant differences between specialities in the development of endurance, strength, and flexibility. This can be corrected by higher education institutions by optimising curricula, increasing the number of hours devoted to physical activity, and introducing integrated training blocks for all specialities.

Physical training has a positive impact on overall health, psychological resilience, academic performance, and students' ability to effectively adapt to academic and stressful loads, as well as developing self-discipline and conscious control over the body. Physical fitness should be maintained at a high level regardless of the field of study, as it affects health, psychological resilience, and academic performance. In addition, S. Saleh *et al.* (2022) evaluated the effectiveness of distance learning in improving physical exercise competence. The study determined that online training programmes have a positive effect on the overall endurance level of students in various fields. Students' physical training should be conducted based on the following algorithm: setting goals and objectives, performing exercises in blocks of aerobic, strength and flexibility training with control of technique and intensity, assessing students' well-being, and finishing with stretching and recovery exercises. This approach ensures the comprehensive development of physical qualities, increases endurance, strength and flexibility, improves psychophysical condition and promotes safe exercise. J. Sun *et al.* (2024) conducted a comparative study of the physical fitness of students from different courses and specialities, determining that endurance, strength and speed indicators are higher among students of humanities specialities at all levels of study. The study confirmed that academic focus and access to physical education classes are positive in shaping physical fitness levels.

Despite numerous studies highlighting the level of physical fitness of students in technical and humanities disciplines, certain gaps remained in terms of comprehensive indicators of strength, endurance and flexibility. Some authors addressed only individual aspects of physical fitness, ignoring interdisciplinary relationships and the influence of the curriculum. The study aimed to analyse changes in the physical fitness and psychophysical condition of students from different educational fields under the influence of a standardised training programme. The objectives of the study were to assess the level of physical fitness and psychophysical condition of students and to formulate practical recommendations for optimising the physical activity of students from different specialities.

Materials and Methods

In a study based on the modelling method, an author's model of a training complex for students was developed based on the principles of comprehensive development of basic physical qualities and the inclusion of three complementary blocks: aerobic, strength training and stretching. The model included the definition of the functional tasks of each block, the distribution of time and intensity of exercise performance, the provision of control over the technique of performance and well-being during classes, as well as the compilation of a logical training scheme that ensures a balance between the development of endurance, strength and flexibility, versatility of application for students of different levels of training, and integration of the model into the educational process for repeatability, control, and evaluation of effectiveness.

The study was conducted from 3 February to 31 March 2025 at Pavlo Tychyna Uman State Pedagogical University. A total of 150 students aged 18-25 participated, including 72 male and 78 female full-time students belonging to two different groups and fields of study: humanities, students of the Faculty of Philology and Journalism, and the Faculty of Engineering and Pedagogical Education. The inclusion criteria were individuals who had no medical contraindications to physical activity and provided written informed consent. Students with acute illnesses or injuries within three months prior to the experiment were excluded. The author's model was introduced into the training of two groups, namely 75 students each from technical and humanities specialities.

A model of basic exercise blocks was developed for the training complex that students performed during the eight weeks of the experiment. Figure 1 shows how each session consisted of three basic blocks: aerobic exercise, strength functional exercises, and flexibility exercises, with an indication of the recommended time allocated to each block. This model ensured a clear balance between the development of different physical qualities and that the training programme had an equal impact on students in both groups.

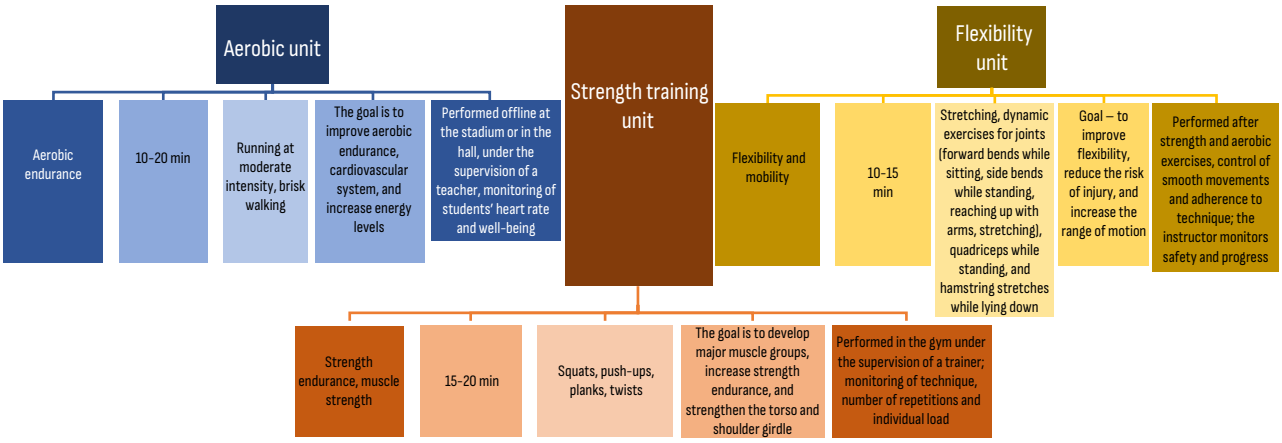

Figure 1. A structural model of a training complex for students aimed at developing aerobic endurance, strength endurance and flexibility

Source: compiled by the authors based on American College of Sports Medicine (n.d.), C.J. Caspersen *et al.* (1985), A.D. Faigenbaum & G.D. Myer (2010), C.E. Garber *et al.* (2011), M. Buchheit & P. Laursen (2013), D.G. Behm *et al.* (2016), World Health Organization (2020)

The proposed structural model of a training session was based on the principles of comprehensive development of the basic physical qualities of student youth and included three complementary blocks that combined aerobic, strength, and flexibility training. This structural design ensured a balanced impact on the cardiovascular system, muscular system, and mobility, developing the functional state of the body without excessive overload. The model was designed for universal application, as it did not require specialised equipment, was suitable for students of different levels of initial fitness, and corresponded to evidence-based approaches to health training for young people. Each block of the model performed a specific functional role. The aerobic part ensured the development of endurance through moderate cyclic loads. The strength block was aimed at building muscle endurance and strengthening the main muscle groups, and the final flexibility block helped to normalise muscle tone, improve mobility, and prevent injuries. A component of the model was the monitoring of technique, intensity, and well-being by the teacher or instructor during each session, which increased safety and standardisation of performance. The generalised structure of the training model was presented in the form of a diagram that reflected the logic of the session structure, the functional purpose of each block, and the specifics of their application in the learning process. The model was designed for simplified integration into the educational environment of the university, ensuring repeatability, controllability, and the possibility of further evaluation of effectiveness.

Preliminary screening was conducted online using a short health questionnaire; all physical measurements were taken offline at a sports complex. All participants underwent physical condition and fitness assessments at the initial stage. The International Physical Activity Questionnaire IPAQ-SF (2002) and the WHO-5 well-being scale (2024) were used to assess the level of daily physical activity, and psychophysical status was assessed on a six-point scale (0 – "never", 5 – "all the time"). The metrics were converted into an index from 0 to 100 points. Physical fitness was assessed using standardised tests, the 12-minute Cooper test (the distance covered was recorded as an indicator of aerobic endurance), a test of upper body strength endurance (number of "twists" in 1 minute), upper shoulder girdle strength endurance test (maximum number of push-ups in 1 minute), long jump to assess explosive strength, and sit-and-reach test to determine flexibility. All tests were performed after a standardised warm-up, in the same order and with controlled rest periods between exercises. The assessments were performed by instructors with prior training. The observation included verification of the exercise technique correctness, load intensity, frequency of breaks, fatigue, pulse, and the subjective well-being of the participants. Factors such as instruction compliance and discipline during the session were incorporated.

All participants completed the initial assessment and followed the identical training programme for eight weeks, consisting of three 45-60-minute sessions per week. The programme included 10-20 minutes of aerobic running at moderate intensity, 15-20 minutes of functional strength exercises (squats, push-ups, planks, twists) and 10-15 minutes of flexibility exercises. The exercise programme was selected due to an even effect on basic physical qualities, safety, and correlation with the key tests used for assessment, which ensured reliable monitoring of changes in physical fitness. The sessions were held offline in a gym under the supervision of an instructor. Students could not independently change the training program to ensure the same effect on both groups. During the experiment, students were also observed during training, which was used

to assess physical metrics, behavioural and motivational aspects. After completing the 4-week programme, the students underwent the same measurements using an identical protocol, including WHO-5, IPAQ-SF and the entire set of physical tests. The procedures were followed without change to ensure the accuracy of the "before" and "after" data comparison. Ethical standards were enforced based on the American Sociological Association (1997), which included written consent, data storage under codes, the option to withdraw at any time, and the presence of a specialist capable of providing first aid. The research protocol was approved by the university's local ethics committee.

Comparison of humanities and technical students was conducted in two areas: by initial metrics and by changes after the training programme. Recommendations were developed based on the obtained data obtained, covering characteristics of physical fitness of students of different specialities, in particular, the optimal amount of aerobic and strength activity, the advisability of including certain types of exercises, the approximate frequency and intensity of training for both groups, as well as recommendations on the use of self-report scales for further monitoring of the physical and psychophysical condition of students in the educational process.

Results

Assessment of physical fitness and psychophysical condition of students

Higher education involves not only intensive learning, lectures, tests and exams, but also formation of lifestyle habits with long-term consequences for health. Physical activity among students is a factor affecting physical health, psychological stability and academic performance. Exercises reduce stress, improve recovery after exertion, and academic productivity. Furthermore, physical activity promotes mindfulness and psychological resilience, contributing to a positive mental state and reducing distress (Teuber *et al*., 2024). Systematic reviews also highlight a strong correlation between physical activity, self-esteem, reduced depression symptoms, and overall student well-being. The cognitive and academic benefits of sports are no less relevant. Even short exercise breaks during study can improve attention, memory and motivation in students, reduce mental fatigue and maintain productivity during the learning process. Physical activity may indirectly influence academic performance through psychological variables, as some studies noted that self-esteem and depression mediate the relationship between physical activity and academic achievement (Li & Huang, 2025).

Role of physical activity is only increasing due to internal barriers (e.g., lack of time, heavy study load) and external barriers (e.g., inadequate infrastructure or support from universities) (Latino *et al*., 2025). Students have low awareness of the role of physical activity for health, which highlights the need for systematic sport and regular exercise encouragement. Therefore, analysing students' physical fitness and studying differences in academic orientation (technical and humanities majors) is relevant. This approach can be used not only to assess the current level of physical activity but also to formulate recommendations that could be implemented in the educational process of universities to improve the overall physical and psychological potential of students.

The level of physical fitness of students does not always reflect their psychophysical state, since good physical shape does not guarantee a high level of adaptation to stress or psychological comfort. In turn, the psychophysical state affects the ability to perform physical exercises, refuting the direct connection between fitness and the general state of the body. The sequence of assessment procedures and stages of implementation of the training model was systematised throughout the research methodology and summarised in Table 1. The table shows the main steps that made it possible to track the dynamics of changes in the physical and psychophysical fitness of students, as well as demonstrating the structure of the experiment as a holistic process.

Table 1. Results of the experiment: students' readiness before and after the training complex

Group 1 before	Group 1 after	Group 2 before	Group 2 after
1. International physical activity questionnaire IPAQ-SF (2002)			
How often have you done intensive exercise in the last week?			
1-25% 2-30% 3-20% 4-15% 5-10%	1-10% 2-20% 3-30% 4-25% 5-15%	1-23% 2-28% 3-20% 4-18% 5-11%	1-8% 2-15% 3-28% 4-30% 5-19%
Duration of intensive exercise			
1-28% 2-32% 3-20% 4-12% 5-8%	1-6% 2-12% 3-25% 4-28% 5-29%	1-25% 2-30% 3-18% 4-15% 5-12%	1-5% 2-10% 3-22% 4-30% 5-33%
How often did you engage in moderate exercise during the week?			
1-22% 2-28% 3-25% 4-15% 5-10%	1-4% 2-10% 3-22% 4-32% 5-32%	1-24% 2-28% 3-22% 4-15% 5-11%	1-3% 2-8% 3-20% 4-35% 5-34%
Duration of moderate exercise			
1-25% 2-30% 3-22% 4-13% 5-10%	1-5% 2-12% 3-24% 4-30% 5-29%	1-23% 2-28% 3-20% 4-18% 5-11%	1-4% 2-10% 3-22% 4-32% 5-32%
How often did you walk for ≥10 minutes?			
1-20% 2-25% 3-28% 4-15% 5-12%	1-3% 2-8% 3-22% 4-35% 5-32%	1-22% 2-28% 3-25% 4-15% 5-10%	1-2% 2-7% 3-20% 4-33% 5-38%
Duration of daily walking			
1-22% 2-28% 3-25% 4-15% 5-10%	1-4% 2-10% 3-25% 4-32% 5-29%	1-23% 2-28% 3-22% 4-18% 5-9%	1-3% 2-8% 3-20% 4-35% 5-34%
Sitting time during the day			
1-30% 2-25% 3-20% 4-15% 5-10%	1-5% 2-10% 3-20% 4-30% 5-35%	1-32% 2-28% 3-20% 4-15% 5-5%	1-4% 2-8% 3-18% 4-30% 5-40%
2. WHO-5 well-being scale (2024)			
I felt energetic			
0-5% 1-15% 2-25% 3-30% 4-15% 5-10%	0-2% 1-8% 2-20% 3-30% 4-25% 5-15%	0-4% 1-12% 2-22% 3-28% 4-20% 5-14%	0-1% 1-5% 2-15% 3-25% 4-30% 5-24%
I woke up refreshed			

Table 1, Continued

Group 1 before	Group 1 after	Group 2 before	Group 2 after
0-6% 1-14% 2-24% 3-30% 4-16% 5-10%	0-2% 1-7% 2-18% 3-32% 4-25% 5-16%	0-5% 1-10% 2-20% 3-30% 4-20% 5-15%	0-1% 1-5% 2-15% 3-25% 4-28% 5-26%
I was calm and relaxed			
0-5% 1-15% 2-25% 3-28% 4-17% 5-10%	0-1% 1-8% 2-20% 3-30% 4-25% 5-16%	0-4% 1-12% 2-22% 3-28% 4-22% 5-12%	0-1% 1-5% 2-15% 3-25% 4-30% 5-24%
I felt interested in everyday affairs			
0-6% 1-14% 2-24% 3-30% 4-16% 5-10%	0-2% 1-7% 2-18% 3-32% 4-25% 5-16%	0-5% 1-10% 2-20% 3-30% 4-20% 5-15%	0-1% 1-5% 2-15% 3-25% 4-28% 5-26%
I was in a good mood			
0-5% 1-15% 2-25% 3-28% 4-17% 5-10%	0-1% 1-8% 2-20% 3-30% 4-25% 5-16%	0-4% 1-12% 2-22% 3-28% 4-22% 5-12%	0-1% 1-5% 2-15% 3-25% 4-30% 5-24%
3. Tests (average value in the group)			
12-minute Cooper test, m			
1,200	1,600	1,400	2,200
Twists per minute, number			
18	25	20	30
Push-ups in 1 minute, number			
12	18	15	22
Standing long jump, cm			
185	205	190	220
Sit and reach test, cm			
18	24	19	28

Note: Group 1 – students majoring in the humanities; Group 2 – students majoring in technical subjects
Source: compiled by the authors

The results of the observation demonstrated differences in endurance and coordination between the groups. The results of the study show a positive trend in the physical fitness and psychophysical condition of students after performing the same training complex in both groups. Group 1, consisting of humanities students, demonstrated improvement in all tests compared to the initial indicators, but the progress was slightly less than that of Group 2, which consisted of technical students. Following Table 1, the physical fitness of students majoring in technical subjects was higher even before the start of the experiment, since the level of activity of students in this field was also higher. This can also be related to improved results after the implementation of the training programme, since a trained body is better able to withstand aerobic and anaerobic loads. Students of technical specialities regularly attended the gym, as most of their learning process involves long hours of computer work, which requires compensation for physical activity. In addition, technical students participate in laboratory and practical classes that involve regular physical activity, such as operating equipment, moving between workstations, and performing physically active tasks during experiments. Humanities students have a more flexible schedule with an emphasis on creative and interactive exercises, discussions, group projects and working with materials, which provides less structured physical activity but promotes the development of cognitive and social skills.

Analysis of the WHO-5 results also demonstrated positive dynamics in the psychophysical state of both groups. In all five statements, students demonstrated an increase in the percentage of high scores (4-5 points) after the training complex, with group 2 of technical students showing a more pronounced improvement in energy, feelings of relaxation, calmness and interest in daily activities compared to group 1 of humanities students. As for the strengths of the training complex, it is worth noting that it evenly affects the main physical qualities, aerobic endurance (running for 10-20 minutes), strength endurance (functional strength exercises for 15-20 minutes) and flexibility (stretching exercises for 10-15 minutes). The complex also provides a safe load for students of different levels of training and monitors progress using standardised tests. The disadvantages of the complex are a relatively short duration of each exercise block and the same intensity for all students, which may not fully correspond to the individual level of training for less active humanities students. Furthermore, the limited duration of training (45-60 minutes) prevents the maximum development of individual physical qualities in more trained technical students. The implementation of the training complex over eight weeks had a positive effect on the physical fitness and psychophysical state of both groups, with technical students demonstrating a higher level of physical fitness and better indicators of psycho-emotional state after the experiment, which indicates the effectiveness of a systematic, comprehensive approach for students of different academic fields.

Group 1 (humanities students) showed higher fatigue during strength training, when performing push-ups and twists, as well as more frequent breaks for rest. At the same time, students in the technical group (group 2) demonstrated more stable endurance, more precise movement technique, and less fatigue, which ensured full intensity without extended breaks. Observations also revealed that both groups gradually increased their motivation and interest, demonstrated perseverance during repetitions of strength and flexibility exercises, and adhered to safety rules and proper technique. In addition, the second group showed higher concentration and ability to perform tasks

in team mode, while the first group sometimes showed a decrease in attention after intense blocks. Thus, the results of the observation confirm the test data: students of technical specialities demonstrated a higher level of physical fitness and better stress resistance, while humanities students, although they showed improvement in physical and psychophysical indicators, needed more control over intensity and breaks. The observation emphasised that the training complex not only develops physical qualities but also has a positive effect on the motivation, discipline and psychological readiness of students for systematic physical exertion.

Practical recommendations for the optimisation of physical activity among students of different specialities

Based on the data obtained and the results of the experiment, a set of practical recommendations was developed for organising physical activity for students of humanities and technical specialities, incorporating initial physical indicators, psychophysical condition, motivation and needs in the educational process. These recommendations are designed to be implemented in the university curriculum or a separate physical education module, and can also be used in students' extracurricular activities to support health and physical development. Introduction of systematic training complexes for students of both specialities is recommended, with a frequency of three sessions per week and a duration of 45-60 minutes per session. University sports halls or outdoor areas in favourable weather conditions should be prioritised in training. A standard warm-up for 5-10 minutes should be performed at the start of each class, incorporating light cardio exercises, flexibility exercises for the main joints, dynamic stretching to prepare the body for further exertion and reduction of the risk of injury. Students are advised perform warm-up exercises under supervision of a physical education teacher or trainer to monitor the technique and rhythm of the exercises. To develop aerobic endurance, it is recommended to include moderate intensity running or brisk walking for 10-20 minutes in each session. For humanities students, it is advisable to begin with shorter distances or lower intensity, gradually increasing the running distance and speed while monitoring pulse and well-being. For students of technical disciplines, longer distances or interval running exercises with moderate speed alternation can be recommended to maintain the high level of aerobic endurance they demonstrated during the experiment. Running or walking should be conducted at the university stadium or on equipped grounds with a flat and safe surface. An instructor should monitor the accuracy of the exercises, ensure a steady pace, and gradually increase the load throughout the eight weeks.

To develop strength, endurance, and muscle strength, functional exercises with body weight, such as squats, push-ups, planks, and twists are recommended. Strength exercises should be performed in the university gym or in a designated room with minimal equipment. It is recommended to allocate 15-20 minutes for each strength training session, dividing the exercises into sets. For humanities students, fewer repetitions and sets should be used, gradually increasing the load to avoid overexertion and ensure safe progression. For technical students, a higher number of repetitions or more intense sets can be used due to a higher basic strength training level. Trainer should constantly monitor technique, correct mistakes and advise on correct distribution of the load to ensure safety of exercises. To develop flexibility and joint mobility, it is recommended to include 10-15 minutes of stretching exercises at the end of each class. Stretching exercises should be performed smoothly, without jerks, with an emphasis on a controlled range of motion. Humanities students should prioritise flexibility exercises due to lower initial flexibility and lower endurance during strength and aerobic activities. Technical faculty students are advised to combine traditional stretching with dynamic functional movements to develop coordination, endurance, and overall mobility. Regarding the frequency and structure of classes, it is recommended to conduct training regularly, for example, Monday, Wednesday, and Friday at set hours in the morning or afternoon, to ensure maximum student attendance. The physical education teacher or coach should plan classes, inform students on schedule changes, preparation and necessary equipment (sportswear, trainers, water bottle). It is also advisable to organise small subgroups of 5-8 people to ensure individual control and increase student motivation through mutual support and healthy competition.

Self-report scales IPAQ-SF (International Physical Activity Questionnaire IPAQ-SF, 2002) and WHO-5 (WHO-5 well-being scale, 2024) are recommended for training intensity and efficiency monitoring. Each week, students complete short questionnaires to track physical activity, psychophysical condition, and well-being. The teacher or trainer analyses the data obtained, identifies weaknesses in the workload, and adjusts the programme per individual needs and training response. In particular, if increased fatigue is notable among humanities students, a temporary reduction of strength training intensity or increase in break duration between sets is recommended, while for technical students, additional repetitions or more complex exercise options can be added. Another recommendation is to gradually increase the load over eight weeks, based on the students' initial fitness levels. Humanities students should be advised to start at a slower pace, with fewer repetitions and shorter aerobic distances, increasing the intensity each week by no more than 5-10% of the initial level. Students in technical fields can be offered more complex exercises, more repetitions, increased duration of aerobic blocks, or varied interval training to ensure the development of high levels of endurance, strength, and flexibility. For the motivation and support of the psychological and emotional state of students, integration of game elements, relay races, team exercises and coordination exercises into training is recommended. Such elements should be conducted under the supervision of a physical education teacher for adjusting the intensity, alternating between intense and calm exercises, and ensuring safety. This ensures positive training, promotes discipline, fosters team spirit, and encourages regular participation in the programme. Individual characteristics of students should be accounted for. At the initial stage, the physical education teacher should screen students' health (questionnaires, BMI (body mass index) measurements, assessment of basic physical fitness) to identify individuals with limitations or a need for modified exercise. Lower intensity aerobic and strength training, increased rest, and additional stretching exercises are applicable for students with low initial

physical fitness. For students with high fitness levels, it is advisable to provide more complex exercise options, increase the number of repetitions or integrate functional training elements of functional, which stimulates progress without the risk of overload.

To monitor results and evaluate the effectiveness of the programme, repeated measurements of physical indicators (12-minute Cooper test, test of strength endurance of the torso and upper shoulder girdle, standing long jump, flexibility test) and WHO-5 (WHO-5 well-being scale, 2024) and IPAQ-SF (International Physical Activity Questionnaire IPAQ-SF, 2002) questionnaires are recommended. The instructor should analyse the obtained data and adjust training to ensure an optimal proportion of aerobic, strength and flexibility exercises for each group. Constant exercise technique, intensity, student well-being, motivation and attention should be observed and monitored during training. A teacher or trainer can keep an observation log, record individual and group responses to loads, adjust intensity and duration of exercises in real time. Humanities students with lower endurance and students with high initial fitness levels, necessitating additional incentives to progress, require closer monitoring. To maintain discipline and regular participation in the programme, it is recommended to establish clear attendance rules, incentive systems for activity and progress (e.g., points for attendance and exercise completion), and to create a friendly team atmosphere during training sessions. This can be achieved via the formation of subgroups, team-based competitions, game element integration, and short motivational briefings before the start of the session. Thus, the set of recommendations includes specific actions, the duration and frequency of training sessions, the structure of aerobic, strength and stretching exercises, technique and intensity control, monitoring of psychophysical condition using self-report scales, gradual increase in load in accordance with individual capabilities, integration of motivational game elements and regular monitoring of results. These recommendations will contribute to the physical fitness and psychophysical condition of students in both groups, optimise the learning process, and ensure safety during training. It will also create conditions for the continuous development of aerobic and strength endurance, flexibility, and coordination of movements in students of different specialities. The recommendations provide a clear algorithm for the organisation of a training programme that ensures a balance between the intensity of the load, safety and effectiveness for students of different levels of physical fitness. The recommendations provide flexibility in implementation, maintain student motivation, contribute to improving psychophysical well-being, and can be used for objective assessment of progress using standardised tests and questionnaires. The technical group had better initial results in most physical fitness and well-being metrics; therefore, greater progress after training exercises confirms the efficiency of the programme and potential for further development of physical qualities. Initial higher physical fitness improved exercise learning rate and achieved noticeable improvements in Cooper tests, sit-ups, push-ups and flexibility, which emphasises the role of systematic training even for groups with a higher starting level. In general, the implementation of a systematic training complex based on these recommendations will ensure the formation of sustainable skills and physical potential in students, increase their adaptation to academic and life stresses, and promote the development of a healthy lifestyle for both humanities and technical students.

Discussion

The difference in physical fitness of technical and humanities students was evident in endurance, strength, and reaction speed. Analysis of the WHO-5 questionnaire (WHO-5 well-being scale, 2024) also demonstrated positive dynamics in the psychophysical state of both groups, however, technical students had higher scores for energy, relaxation, calmness, daily interest and positive mood after the training programme, with 65-75% of high scores (4-5 points), while for humanities students this figure was 50-60%. Technical students demonstrated higher levels of overall physical strength and aerobic endurance, while humanities students showed better flexibility and coordination of movements. This differentiation indicates the influence of the specifics of the educational model and the regime of educational activities on the formation of physical qualities, which is consistent with the previous conclusions of L.A. Gallo *et al.* (2020), noting a change in the level of physical activity of students during restrictive measures due to COVID-19. The results of the study confirmed that physical activity related to the educational process shapes the body's adaptive abilities and has different dynamics among students of different specialities.

The strength and endurance correlation indicates the influence of practical laboratory classes and technical exercises on maintaining a high physical fitness level. Higher flexibility scores among humanities students are consistent with the findings of K. Nikolopoulou (2022), noting that intellectually oriented curricula with active elements of creativity and physical activity contribute to the development of coordination and flexibility of the body. This correlation confirmed the assumption that the development of physical qualities differs between disciplines. Aerobic endurance test results show a statistically significant advantage for technical students in running distance and cardiorespiratory endurance tests. This is consistent with the comparison of the physical activity of students by G.I. Butnaru *et al.* (2021), which noted a decrease in endurance among students without regular physical activity. The results confirmed conclusions regarding the need to include physical exercise in the educational process to maintain an optimal level of physical fitness. The study determined that regular laboratory and practical classes incorporating physical activity maintain high strength and aerobic fitness levels. Analysis of speed abilities demonstrated a moderate advantage for humanities students in reaction speed and agility tests. A comparison of the results with the study by M. Sun *et al.* (2025) indicated that speed, agility and reaction exercises, in particular short-distance running, direction change exercises and multi-speed training, stimulate quick reactions. The study demonstrated that such exercises improve acceleration, rapid change of direction, leg strength, and reaction time, ensuring comprehensive development of physical qualities. In particular, the results of the study highlighted that group 1 increased the average number of twists from 18

to 25 in the upper body strength endurance test, while group 2 increased from 20 to 30, and in push-ups per minute, the results increased from 12 to 18 and from 15 to 22, respectively. The standing long jump, which assesses explosive power, showed an increase in the average result in group 1 from 185 to 205 cm, and in group 2, from 190 to 220 cm, while the sit-and-reach flexibility test showed an improvement from 18 to 24 cm in humanities students and from 19 to 28 cm in technical students.

Teaching methods based on interactivity and physical activity improve coordination skills among students. Overall physical fitness indicators demonstrated a statistically significant difference between groups, which can be attributed to differences in educational structure and workload across different specialisations. This is consistent with the findings of C. Huang *et al.* (2024), noting that the type of learning activity and its integration with physical activity affect overall functional readiness indicators. The combination of regular practical classes and laboratory assignments with physical exercises contributes to the formation of sustainable physical skills in technical students, while humanities majors ensure the development of flexibility and speed-coordination abilities through interactive teaching methods. Physical fitness also depends on biological factors and individual physical activity, highlighting the need to consider these aspects when planning educational programmes. A comparison of the data obtained with the study by C.E.B. Brown *et al.* (2024) confirmed the impact of the learning activity regime on physical activity. Students of technical specialities were more often involved in laboratory and practical classes that involved physical activity, while humanities specialities provided a more flexible regime with an emphasis on creative and interactive exercises. This confirms the conclusions regarding the significance of the structure of educational activities for maintaining physical fitness. The higher level of endurance observed among students of technical specialities was consistent with the results of studies by V. Ryabchenko *et al.* (2021), highlighting the impact of physical education classes on the health of students of technical specialities. The results determined that regular physical exercise improves physical fitness, health, and promotes the formation of healthy habits for an active lifestyle. Y. Zhou *et al.* (2025) highlighted that various exercises contribute to different physical qualities; team games and individual activities improve endurance and coordination; the positive effect of strength and flexibility tests; and exercises for motor skills and precision of movements. The author's model in this study also included various exercises with unique effects on the development of physical qualities.

Humanities students have lower physical fitness levels than technical students. This result correlates with data from Y. Berezhna *et al.* (2024), based on analysis of thinking patterns and physical activity of humanities students. The data highlighted that curricula of these specialities provide less structured physical activity, prioritising creative and interactive classes that develop cognitive and social skills. Furthermore, the results of the study can be used to assess the impact of the learning environment and the organisation of the educational process on physical activity. Data from Z.U. Umarova & Y.Y. Umarov (2024) emphasised that educational institutions that integrate physical activity into the learning process contribute to maintaining a high level of physical fitness among students. The results demonstrated the role of motivational factors and the social environment. S. Chowdary (2020) noted that a combination of face-to-face and distance learning (blended learning) promotes student engagement in active learning, which could influence physical activity. Furthermore, the recommendations include systematic 8-week training programmes, three times a week for 45-60 minutes, divided into aerobic, strength and stretching blocks, warm-up and recovery exercises, technique and well-being monitoring during classes, gradual increase in load based on individual abilities, use of self-report scales to assess effectiveness (IPAQ-SF, WHO-5), integration of game elements for motivation, as well as regular monitoring of results and programme correction. K. Gapparov & K. Akhmedov (2020) also noted that the implementation of recommendations for the introduction of a training complex into the educational process of universities ensures an increase in the level of physical fitness, psychophysical condition, safety and adaptation of students to educational loads, regardless of their specialisation. The results demonstrate that speciality and organisational features of the educational process affect the level of physical fitness of students, forming different trends in endurance, strength, flexibility and coordination. Different learning formats and access to extracurricular physical activities determined the ability to maintain and develop physical activity, which is crucial for overall health and physical development.

Conclusions

The experiment, which involved students of humanities and technical specialities, demonstrated significant positive changes in both the physical indicators and the psychophysical state of the participants. All tests demonstrated an increase in results, and stability of dynamics was confirmed by the dynamics of the selected load. Aerobic endurance of humanities students increased from 1,200 to 1,400 metres (+16.7%), and technical students from 1,600 to 2,200 metres (+37.5%); strength indicators increased from 18 to 25 "twists" and 12 to 18 push-ups in the humanities group, and 20 to 30 "twists" and 15 to 22 push-ups in the technical group. The increase in standing long jump (185 → 205 cm and 190 → 220 cm, respectively) and flexibility (18 → 24 cm and 19 → 28 cm) confirmed the positive influence of exercises.

Based on the obtained data, the introduction of a training complex into the educational process of universities, three times a week for 45-60 minutes, moderate-intensity aerobic exercises in a stadium or gym, strength training under the supervision of an instructor for technique correction and individual load adjustment, and a final flexibility session for injury prevention and recovery, is recommended. For humanities students, it is recommended to increase the proportion of aerobic exercises to the upper limit of the model (20 minutes), and for technical students, to improve the strength training by increasing the number of repetitions or the duration of exercises with gradual progression. Monitoring of the psychophysical condition of students once every two weeks using the WHO-5 and a short IPAQ-SF questionnaire should be conducted to adjust the loads. Teachers are advised to record exercise techniques,

ensure the adaptation of loads for students with lower fitness levels, and monitor signs of fatigue, motivation, and participation in classes. A limitation of the study is the sample of a single university, which reduces the complete generalisation of results to all students. Further studies should expand the sample, include students from other specialities, and analyse the long-term impact of the training model on health and academic performance.

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Conflict of Interest

None.

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Порівняльний аналіз рівня фізичної підготовленості студентів технічних і гуманітарних спеціальностей

Ігор Таранець

Викладач
Уманський державний педагогічний університет імені Павла Тичини
20304, вул. Садова, 26, м. Умань, Україна
https://orcid.org/0009-0001-6332-573X

Віталій Сиволдаєв

Викладач
Уманський державний педагогічний університет імені Павла Тичини
20304, вул. Садова, 26, м. Умань, Україна
https://orcid.org/0009-0001-5675-0754

Анотація. Метою дослідження було порівняння рівня фізичної підготовленості студентів технічних і гуманітарних спеціальностей на основі авторської моделі комплексного тренування у закладі вищої освіти. Методологія включала створення авторської моделі, експеримент тривав з 3 лютого по 31 березня 2025 року на базі Спортивного комплексу Уманського державного педагогічного університету імені Павла Тичини, у якому взяли участь 150 студентів, та формулювання рекомендацій. Результати показали, що впроваджена програма спричинила статистично значущі позитивні зрушення у всіх ключових показниках. Аеробна витривалість студентів гуманітарної групи збільшилася з 1 200 до 1 400 м (+16,7 %), а технічної – з 1 600 до 2 200 м (+37,5 %); силова витривалість у «скручуваннях» зросла відповідно з 18 до 25 повторів (+38,9 %) та з 20 до 30 повторів (+50 %); кількість віджимань – з 12 до 18 (+50 %) та з 15 до 22 (+46,7 %). Показники вибухової сили покращилися з 185 до 205 см у гуманітаріїв і з 190 до 220 см у технічної групи. Гнучкість за тестом зросла на 6 см (18→24 см) та на 9 см (19→28 см) відповідно. За опитувальником студенти із високим рівнем психоемоційного благополуччя після програми збільшилася до 44 % у гуманітарної та до 50 % у технічної групи, що свідчить про позитивний вплив фізичних навантажень на суб'єктивний психологічний стан. Отримані результати означають, що комплексна тренувальна модель здатна підвищувати рівень фізичної підготовленості та психологічного благополуччя студентської молоді навіть за умов обмеженої тривалості втручання. Результати дослідження можуть бути використані викладачами фізичного виховання, тренерами студентських секцій, адміністрацією університетів для оптимізації навчальних планів, а також фахівцями у сфері спортивної педагогіки та оздоровчої фізичної культури для розробки програм підвищення фізичної активності молоді

Ключові слова: структурна модель; тренувальний комплекс; психофізичний стан; аеробне навантаження; функціональні вправи