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The Effect of a One-Semester Physical Education and Sports Course on University Students' Physical Fitness, Performance and Health Parameters

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The Effect of a One-Semester Physical Education and Sports Course on University Students' Physical Fitness, Performance and Health Parameters

Abstract

This study aimed to examine the changes in physical and performance parameters of university students who participated in a one-semester (4-month) physical education and sports course.

The research was conducted using a pretest and posttest experimental design. The participants consisted of 444 students studying at Kyrgyz-Turkish Manas University, including 286 females (mean age: 19.02 ± 0.91 years) and 158 males (mean age: 19.26 ± 0.95 years). Measurements included body weight, height, body mass index (BMI), standing long jump, flexibility, agility, sit-up (abdominal muscular endurance), and anaerobic power tests. Data were analyzed using IBM SPSS 25. Independent samples t test was used for gender comparisons, and paired samples t test was applied to determine pretest and posttest differences. The level of significance was set at $p < 0.05$.

The mean ages of participants were similar (females: 19.02 ± 0.91; males: 19.26 ± 0.95), while males had significantly greater height averages ($p < 0.001$). After the four-month period, both genders showed an increase in body weight and BMI values ($p < 0.001$). Substantial improvements were observed in agility, sit-up, and anaerobic power variables, whereas moderate progress was noted in flexibility. Standing long jump performance increased among females but showed a slight decline in males.

Participation in the physical education and sports course resulted in significant short-term improvements in students' physical fitness levels. The most pronounced enhancements were found in agility, abdominal muscular endurance, and anaerobic power. These findings highlight the essential role of curriculum-based regular exercise in maintaining and improving the physical performance of young adults.

Keywords: Sport, Physical fitness, Performance

Introduction

Physical activity is recognized as a fundamental component in maintaining and improving individuals' quality of life. The World Health Organization (WHO, 2020) emphasizes that regular physical activity enhances cardiovascular system functions, strengthens muscle and bone tissues, and supports psychological well-being. However, sedentary behavior patterns characterized by prolonged sitting and low physical activity, which are byproducts of modern lifestyles, have been associated with reduced physical fitness levels and deterioration in metabolic health indicators (Katzmarzyk et al., 2019).

The university period represents a transitional phase during which physical activity habits often weaken. Wang et al. (2023) reported that prolonged physical inactivity among students may lead to unfavorable changes in body composition and declines in physical fitness levels. These findings suggest that academic workload, social environment, and lifestyle factors may reduce participation in physical activity, consequently leading to decreases in muscular strength and overall fitness.

Physical education and sports courses aim to enhance students' participation in physical activity and to promote improvements in physical fitness, motor skill development, and general health parameters (Kohl & Cook, 2013). Nevertheless, in recent years, the removal of these courses from the list of compulsory subjects in many universities has led to a noticeable decline in students' regular engagement in physical activity. This trend poses a significant risk to maintaining physical fitness and fostering lifelong exercise habits among young adults. Previous research has demonstrated that regular participation in physical education and sports programs produces meaningful improvements in parameters such as body weight, body mass index (BMI), agility, flexibility, endurance, and muscular strength (Moreno-Díaz et al., 2024; Butnariu, 2025). However, the transformation of these courses into elective subjects threatens the sustainability of these gains.

Li et al. (2022) found significant associations between body composition variables and physical fitness and performance indicators. Similarly, Moreno-Díaz et al. (2024) reported that regular participation in physical education activities improves both physical fitness and body satisfaction and that these outcomes are closely linked to social and psychological well-being. Aira et al. (2021) observed a marked decline in physical activity levels and an increase in sedentary behaviors during young adulthood. This pattern indicates that reduced engagement in physical activity may gradually lead to lower fitness levels and diminished quality of life. Therefore, maintaining institutional structures that support students' regular access to physical activity within higher education environments is of critical importance.

In recent years, the transition of physical education and sports courses from mandatory to elective status has resulted in decreased participation frequency, making it necessary to reassess their effects on physical performance. Consequently, this study aims to reveal the impact of formerly compulsory physical education and sports courses on students' physical fitness levels and to contribute to the restructuring of physical activity policies within the university context.

Materials and Methods

Research Design

This research was conducted using an experimental design based on a pretest and posttest model. The participants were evaluated before and after completing a one-semester (4-month) physical education and sports course. The course program included aerobic and anaerobic exercises, flexibility training, and general conditioning activities. The study was carried out in accordance with the principles of the Declaration of Helsinki.

Participants

A total of 444 volunteer students enrolled in the physical education and sports course at Kyrgyz-Turkish Manas University during the 2024–2025 academic year participated in the study. The participants consisted of 286 females (19.02 ± 0.91 years) and 158 males (19.26 ± 0.95 years). None of the participants had any chronic health conditions or orthopedic disorders that could prevent regular engagement in physical activity. All students attended the course regularly and completed both the pretest and posttest measurements.

Data Collection Tools and Measurements

Body Weight and Height

The height of the participants was measured using a stadiometer with a precision of 0.1 cm (Kuru et al., 2025). Body mass index (BMI) was calculated by dividing body weight by the square of height (kg/m²) (Nuttall, 2015).

$$BMI = \text{Body Weight (kg)} / \text{Height (m)}^2$$

Flexibility Measurement

The flexibility level of the participants was assessed using the Sit and Reach Test. Participants were asked to extend their legs straight and reach forward as far as possible, and the farthest distance reached was recorded in centimeters. All measurements were conducted with participants barefoot to ensure accuracy (Toktosartov et al., 2021).

Agility Measurement

The agility level of the participants was evaluated using the Illinois Agility Test. This test is designed to assess an individual's ability to change direction, accelerate, and stop quickly. The time taken to complete the course was recorded in seconds, and the best performance for each participant was included in the analysis (Demirhan et al., 2017).

Abdominal Muscle Endurance (Sit-up Test) Measurement

Participants were asked to perform as many correct sit-ups as possible within 30 seconds, and the total number of repetitions was recorded. This method is recognized as a valid field test for assessing abdominal muscle endurance (Kukić et al., 2023).

Standing Long Jump (Explosive Strength) Measurement

Lower limb explosive strength was assessed using the Standing Long Jump Test. Participants jumped horizontally as far as possible from a stationary position, and the best result out of two trials was recorded in centimeters (Castro-Piñero et al., 2010).

Anaerobic Power Measurement

The vertical jump performance of the participants was measured using a wall-mounted jump board with a precision of 0.1 cm. Participants first determined their maximal reach height and then performed three jump trials starting from a 90° knee flexion position. The best result was recorded. Using the obtained jump height and body weight data, anaerobic power was calculated according to the "Lewis Protocol" and expressed in Watts (W) (Demirhan, 2020).

$$\text{Anaerobic Power (W)} = \sqrt{(4.9 \times \text{Body Weight (kg)})} \times \text{Jump Height (cm)}$$

Statistical Analysis

All statistical analyses were performed using IBM SPSS Statistics 25. Descriptive statistics (mean±standard deviation, minimum, and maximum) were calculated for all variables. Independent samples t test was applied to determine gender differences, while paired samples t test was used for pretest and posttest comparisons. Cohen's *d* coefficients were calculated to determine effect sizes, with values between 0.20–0.49 interpreted as small, 0.50–0.79 as medium, and ≥ 0.80 as large effects. The level of significance was set at $p < 0.05$ for all analyses.

Results

The descriptive statistics of the data obtained from the study, as well as the findings related to gender differences and pretest–posttest comparisons, are presented in detail in the following tables. These findings reveal the changes in students' physical fitness and performance parameters after completing a one-semester physical education and sports course.

Table 1. Descriptive Characteristics of the Participant Students (n = 444)

Group	n	Age (year) Mean ± SD	Min–Max	Height (cm) Mean ± SD	Min–Max
Female	286	19.02 ± 0.91	17 – 28	162.12 ± 5.92	146 – 176
Male	158	19.26 ± 0.95	18 – 23	176.85 ± 6.41	160 – 195

The mean ages of the female (n = 286) and male (n = 158) participants were quite similar. However, the average height of the male participants (176.85 ± 6.41 cm) was notably higher than that of the female participants (162.12 ± 5.92 cm). The age range was similar in both groups, indicating that the sample consisted of young adult individuals.

Table 2. Independent Samples t-test Results of Female and Male Participants

Variable	Measurement	Female Mean ± SD	Male Mean ± SD	p	Cohen's d
Body Weight (kg)	Pre-test	56.73±9.99	65.70±9.30	<.001	0.92
	Post-test	58.35±10.37	67.75±9.73	<.001	0.927
BMI (kg/m²)	Pre-test	21.45±2.81	20.98±2.54	0.072	-0.174
	Post-test	22.19±3.68	21.63±2.66	0.064	-0.168
Standing Long Jump (cm)	Pre-test	134.96±13.77	197.20±23.14	<.001	3.521
	Post-test	139.10±14.58	192.47±24.36	<.001	2.862
Flexibility (cm)	Pre-test	33.90±6.56	33.23±6.99	0.325	-0.099
	Post-test	34.92±6.30	33.61±6.89	0.049	-0.201
Agility (s)	Pre-test	22.37±1.94	19.15±1.83	<.001	-1.693
	Post-test	20.89±2.01	17.71±1.87	<.001	-1.617
Sit-up (reps/30 s)	Pre-test	18.78±4.56	26.20±4.68	<.001	1.612
	Post-test	20.33±4.58	27.65±4.68	<.001	1.587
Anaerobic Power (W)	Pre-test	65.69±13.71	98.25±18.01	<.001	2.118
	Post-test	69.34±14.41	103.01±18.87	<.001	2.086

Independent samples t-test results for the pre-test and post-test measurements of female and male participants are presented. According to the findings, statistically significant differences in favor of males were observed in body weight, standing long jump, agility, sit-up, and anaerobic power variables ($p < 0.001$, large effect). In the flexibility variable, a small but significant difference was found in favor of females only in the post-test ($p = 0.049$). No significant differences were observed in BMI values ($p > 0.05$).

Table 3. Paired Samples t-test Results of the Participants (Pre-test and Post-test)

Variable	Group	Pre-test Mean ± SD	Pos-test Mean ± SD	p	Cohen d
Body Weight (kg)	Female	56.73±9.99	58.35±10.37	<.001	3.703
	Male	65.70±9.30	67.75±9.73	<.001	4.46
BMI (kg/m²)	Female	21.45±2.81	22.19±3.68	<.001	0.337
	Male	20.98±2.54	21.63±2.66	<.001	5.085
Standing Long Jump (cm)	Female	134.96±13.77	139.10±14.58	<.001	1.355
	Male	192.47±24.36	197.20±23.14	<.001	0.376
Flexibility (cm)	Female	33.90±6.56	34.92±6.30	<.001	0.562
	Male	33.23±6.99	33.61±6.89	0.0121	0.202
Agility (s)	Female	22.37±1.94	20.89±2.01	<.001	-3.024
	Male	19.15±1.83	17.71±1.87	<.001	-2.928
Sit-up (reps/30 s)	Female	18.78±4.56	20.33±4.58	<.001	3.098
	Male	26.20±4.68	27.65±4.68	<.001	2.896
Anaerobic Power (W)	Female	65.69±13.71	69.34±14.41	<.001	2.636
	Male	98.25±18.01	103.01±18.87	<.001	4.392

Significant improvements were observed in most parameters among both female and male participants ($p < 0.001$). Large effect sizes were found for agility, sit-up, and anaerobic power variables, while moderate to small increases were identified in flexibility. Standing long jump performance improved in both females and males. Additionally, significant increases were recorded in body weight and BMI values for both groups.

Discussion

In this study, significant changes were observed in the physical and performance parameters of university students who participated in a one-semester physical education and sports course. These findings are consistent with previous research in literature.

Firstly, while the participants showed similar mean ages, the male students presented higher average height values (176.85 ± 6.41 cm) compared to females (162.12 ± 5.92 cm), suggesting that anthropometric differences may influence performance. Previous studies have reported that morphological features such as height, muscle mass, and body composition are significantly associated with physical fitness levels (Radu et al., 2014).

According to the independent samples t-test results, statistically significant differences with large effect sizes were found in favor of males in body weight, standing long jump, agility, sit-up, and anaerobic power variables. This indicates that male students may have higher levels of muscular strength and explosive performance compared to female students. Similarly, Ben Mansour et al. (2021) reported that male students demonstrated significantly higher levels of muscle strength and explosive power, which may be attributed to differences in body composition. These findings support the notion that morphological and physiological differences between genders influence performance-related variables.

In the pre-test and post-test comparisons, both groups showed increases in body weight and BMI. Significant improvements were also found in agility, sit-up, and anaerobic power performance. These results indicate that university-level physical education courses not only encourage participation in physical activity but also enhance performance capacity. For example, Wang et al. (2024) reported that a 16-week blended learning model led to significant improvements in flexibility, jumping, and sit-up performance among university students.

Similarly, Kljajević et al. (2021) found that regular participation in physical activity among university students was positively correlated with overall physical fitness levels. Kraemer and Ratamess (2004) also emphasized that

systematically performed exercise programs result in significant improvements in general physical performance.

A noteworthy finding of this study was that male participants showed only a small increase (d = 0.376) in the standing long jump test. This may suggest that the course content did not sufficiently target explosive strength or that the male participants' initial performance levels were already high, limiting observable gains. In flexibility, moderate improvement was found among females and small improvement among males, indicating that flexibility develops more slowly compared to other performance variables.

Overall, this study demonstrates physical fitness and performance gains among young adult university students. Curriculum-based systematic physical activity programs support both morphological and performance-related adaptations. However, the content, intensity, and students' initial fitness levels should be considered when designing such programs.

In conclusion, the one-semester physical education and sports course led to significant improvements in performance indicators such as agility, sit-up, and anaerobic power, while gender-based differences were observed in flexibility and standing long jump parameters. These findings suggest that course-based physical activity programs are effective tools for improving the physical fitness levels of young adults. Therefore, maintaining physical education courses as a sustainable component of higher education curricula is essential for promoting both the physical and psychological well-being of students.

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