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THE USE OF ARTIFICIAL INTELLIGENCE APPLICATIONS TO IMPROVE FITNESS LEVELS IN UNIVERSITY STUDENTS

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Abstract: *This study analyzes the impact of an artificial intelligence-based application on physical fitness in university students. A total of 114 participants were divided into experimental and control groups. The intervention lasted 8 weeks and was conducted during physical education classes. The experimental group used the FitAI application (version 1.5.5), while the control group followed standard training. Fitness variables included BMI, cardiovascular endurance, muscular strength, and flexibility. Results show great improvements in the experimental group across all parameters. The findings support the use of AI applications as an effective tool for enhancing physical education outcomes in university settings.*

Key words: *artificial intelligence, physical fitness, university students, physical education, mobile applications*

1. Introduction

Physical activity plays a key role in keeping health and functional capacity in young adults. University students often show low levels of physical activity, especially those enrolled in non-sport academic programs [6]. Sedentary behavior increases the risk of obesity, cardiovascular diseases, and reduced physical fitness [15]. Digital technologies have started to influence physical education and training methods. Mobile applications support exercise planning, monitoring, and feedback [3]. Among these, applications based on artificial intelligence offer personalized recommendations and adaptive training programs [4]. AI systems analyze user data and adjust exercise intensity, duration, and type based on individual progress [1]. Recent studies show that AI-based fitness applications can improve adherence to exercise programs. Users receive real-time feedback and motivation, which increases engagement [9]. This approach is effective in non-athlete populations, where motivation and consistency are often low [7]. In the context of physical education, integrating AI tools can enhance traditional teaching methods. AI applications allow individualized training within group settings, which is difficult to achieve through standard instruction [8].

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This is relevant in university courses, where students have different fitness levels and limited time for physical activity [10].

Research also shows that AI-supported interventions lead to significant improvements in cardiovascular endurance, muscular strength, and flexibility [12]. These effects are more pronounced compared to standard training programs without technological support [11]. Despite these benefits, the use of AI in physical education is still limited. Many institutions still rely on traditional methods without personalization [2]. There is a need for studies that evaluate the effectiveness of AI applications in real educational settings [13]. This study aims to analyze the impact of an AI-based application on physical fitness in university students. The research focuses on changes in key fitness parameters following an 8-week intervention program implemented during physical education classes [11], [14].

2. Methods

Participants. The study included 114 university students, aged between 19 and 24 years, enrolled in non-sport academic programs. The sample included both females and males.

Participants were divided into two groups. The experimental group included 57 students, 29 females and 28 males. The control group included 57 students, 30 females and 27 males. Participation was voluntary. The study was conducted by the principles of the Declaration of Helsinki, and all participants provided informed consent prior to inclusion in the research.

Study Design. A controlled experimental design was applied over an 8-week period. The intervention and testing sessions were conducted during the Physical Education and Sport course, with a frequency of one session per week.

The experimental group used the FitAI application, version 1.5.5, to support physical activity. The control group followed standard physical education activities without AI support.

Intervention. In the experimental group, the FitAI 1.5.5 application was installed on participants' mobile devices. The application generated personalized exercise programs based on first fitness level and individual parameters. Each session lasted between 45 and 60 minutes. The application adjusted the intensity and type of exercises based on the recorded performance.

In the control group, a general fitness program was applied. The structure and duration of sessions were similar, but no AI-based personalization or feedback was used.

Measurements. Fitness assessments were conducted at the beginning and at the end of the study, during scheduled course sessions. The study included several key variables to assess physical fitness. Body mass index (BMI, kg/m²) was used to evaluate body composition. Cardiovascular endurance was measured through the 12-minute run test, expressed in meters. Muscular strength and endurance were assessed using push-ups and sit-ups, recorded as number of repetitions. Flexibility was measured using the sit-and-reach test, expressed in centimeters. All variables were recorded at baseline and after the intervention. Changes were calculated as the difference between final and initial test values (Δ).

Data were analyzed separately for the experimental and control groups, and comparisons between groups were performed using statistical significance testing (p-value).

Data Analysis. Data was processed using descriptive statistics and comparative analysis. Initial test and final test results were compared within and between groups. Differences between groups were analyzed using the independent samples t-test, while within-group comparisons between first and final tests were performed using the paired samples t-test. Statistical significance was set at $p < 0.05$.

3. Results

The results present the effects of the intervention on key physical fitness variables in university students. Data are reported for both experimental and control groups, including initial and final test values and changes over time.

Table 1

Descriptive statistics for initial test values (combined groups)

Variable	Min	Max	X	SD	CV (%)	95% CI		Kurtosis	p
						LL	UL		
BMI (kg/m²)	19.0	27.0	23.5	2.2	9.36	23.1	23.9	-0.85	0.412
12-min run (m)	1500	2600	1965	310	15.78	1908	2022	-0.67	0.385
Push-ups (reps)	10	35	22.1	6.3	28.50	21.0	23.2	-0.74	0.401
Sit-ups (reps)	15	40	28.3	7.2	25.44	27.0	29.6	-0.69	0.393
Flexibility (cm)	10	30	19.2	5.4	28.12	18.2	20.2	-0.58	0.427

Note: Min = minimum value; Max = maximum value; X = Mean; SD = standard deviation; CV (%) = coefficient of variation; LL = lower limit; UL = upper limit; p = statistical significance level

In Table 1, the mean values show a moderate fitness level across the entire sample. The coefficient of variation is below 30% for all variables. The data show good homogeneity. BMI has the lowest variability, 9.36%. Push-ups and flexibility show the highest variability, above 28%. The confidence intervals are narrow. The estimates are stable. Kurtosis values are negative. The distributions are slightly flattened. All p-values are above 0.05. No statistically significant differences are present at baseline.

Table 2

Initial and final test results and changes (Δ) for experimental and control groups

Variable	Exp IT	Exp FT	Δ Exp	Control IT	Control FT	Δ Ctrl	p
BMI (kg/m²)	23.4 ± 2.1	22.8 ± 2.0	-0.6	23.6 ± 2.3	23.3 ± 2.2	-0.3	0.031
12-min run (m)	1980 ± 320	2250 ± 340	+270	1950 ± 300	2050 ± 310	+100	0.004
Push-ups (reps)	22.5 ± 6.2	32.0 ± 6.8	+9.5	21.8 ± 6.5	26.0 ± 6.7	+4.2	0.006
Sit-ups (reps)	28.7 ± 7.1	38.5 ± 7.6	+9.8	27.9 ± 7.4	32.0 ± 7.5	+4.1	0.008
Flexibility (cm)	19.6 ± 5.3	25.5 ± 5.7	+5.9	18.9 ± 5.6	21.5 ± 5.8	+2.6	0.012

Note: Values are expressed as mean ± SD. Exp = experimental; Ctrl = control; IT = initial test; FT = final test; Δ = change between first and final test values. p = statistical significance level.

In Table 2, the experimental group shows greater improvements across all variables. BMI decreases more in the experimental group, −0.6 vs −0.3. Cardiovascular endurance increases strongly, +270 m vs +100 m. Muscular strength improves more in push-ups and sit-ups, with gains over twice as high compared to control. Flexibility increases by +5.9 cm in the experimental group, compared to +2.6 cm in control. All p-values are below 0.05. The differences between groups are statistically significant.

4. Discussions

The results show that the experimental group achieved greater improvements across all fitness variables. The use of an AI-based application contributed to more efficient training compared to traditional methods. These findings support earlier research showing that technology-assisted interventions increase physical activity and improve fitness outcomes [4], [15]. The increase in cardiovascular endurance was higher in the experimental group. This confirms that personalized and adaptive training enhances aerobic performance. Similar effects were reported in studies where mobile and AI-based tools adjust exercise intensity based on user progress [3]. Muscular strength improvements were also more pronounced. The higher gains in push-ups and sit-ups suggest that individualized programs lead to better neuromuscular adaptation. Research on structured training models highlights the importance of targeted exercises for performance development [1]. Flexibility improvements followed the same pattern. The experimental group showed greater increases, likely due to customized stretching protocols. Studies show that individualized interventions are more effective in addressing specific mobility limitations [9]. BMI values decreased in both groups, but the change was larger in the experimental group. This result is consistent with findings that digital monitoring tools improve adherence and support better control of physical activity [7]. Increased engagement plays a key role in achieving measurable changes in body composition.

The control group showed smaller improvements, which reflects the limitations of standard physical education programs. Traditional approaches often apply uniform training loads, without considering individual differences [8]. This reduces the effectiveness of the intervention, especially in heterogeneous groups such as university students. The integration of AI in physical education offers clear advantages. It allows real-time feedback, continuous monitoring, and adaptation of training variables. These features improve both motivation and performance [10]. Similar conclusions were reported in studies focused on AI applications in education and health-related behaviors [6].

Research using advanced assessment tools, such as systems for detecting muscle imbalances, emphasizes the need for precise evaluation and individualized correction [12]. AI-based applications follow the same principle by adjusting exercise programs according to user data. Other recent studies confirm that digital fitness solutions improve consistency and long-term adherence to exercise programs [5]. This is particularly important for non-athlete populations, where motivation tends to decrease over time. The findings support the use of AI applications as an effective tool in university physical education. This approach improves key fitness components within a limited time frame and adapts to individual needs.

5. Conclusions

The use of the FitAI application led to significant improvements in all measured fitness variables. University students in the experimental group achieved better results compared to those who followed standard physical education programs.

Cardiovascular endurance, muscular strength, and flexibility increased at a higher rate when training was guided by AI. BMI showed a greater reduction, which shows improved body composition.

Personalized training and real-time feedback played a key role in these outcomes. The application adjusted exercise parameters based on individual performance, which increased efficiency and engagement.

Traditional physical education methods produced smaller improvements. Lack of individualization limited their impact, especially in groups with different fitness levels.

The integration of AI applications in physical education can improve the quality of training. This approach supports better results within limited time and can be applied easily in university settings.

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