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THE EFFECT OF THE SPORTS CLUB MODEL ON THE PHYSICAL FITNESS IMPROVEMENT OF FEMALE STUDENTS AT VIETNAM NATIONAL UNIVERSITY, HO CHI MINH CITY

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Abstract

Introduction. The traditional physical education (PE) model faces challenges in engaging students actively. This study investigates the effectiveness of a sports club-based PE model in improving the physical fitness of female students at Vietnam National University Ho Chi Minh City (VNU-HCMC). The primary objective is to assess the effect of this model on overall fitness development, compared to the conventional PE program. ***Material and methods.*** The study involved 128 healthy female students divided into an experimental group (EG, n = 68) and a control group (CG, n = 60). The EG participated in a sports club-based model, with activities ranging from Jianzi to volleyball, while the CG followed the standard PE curriculum. The study was conducted over a semester with both pre- and post-intervention fitness assessments. Fitness metrics, such as grip strength, sit-ups, standing long jump, and 30 m sprint, were evaluated using standardized testing methods. ***Results.*** After the intervention, the EG demonstrated significant improvements across all fitness tests compared to the CG. Notable gains were observed in sit-up performance (EG: 39.08%, CG: 23.71%) and grip strength (EG: 24.27%, CG: 15.23%). Reductions in sprint times and agility enhancements were also more pronounced in the EG, indicating the greater overall effect of the sports club model on physical fitness development. ***Conclusions.*** The sports club-based PE model offers a more engaging and effective approach to improving physical fitness in female university students. Its integration into the university curriculum could lead to broader health benefits and enhance students' motivation towards regular physical activity.

Key words: physical fitness enhancement, sports-based education, female student health, university physical education, fitness intervention programs

Introduction

Physical fitness among university students is a significant issue in many educational systems, with traditional physical education programs often failing to fully engage students or promote balanced physical development [1]. These conventional programs can be limited in their ability to enhance strength, endurance, and agility, resulting in many students exhibiting low levels of physical fitness and reduced interest in physical education. This situation underscores the need for more effective approaches to physical education that can better meet students' physical development needs [2]. The serious decline in the physical fitness of many university students is often attributed to the traditional focus on skill-based instruction, low student participation, and an educational system that prioritizes academic pursuits over physical development [3]. This has resulted in students lacking the opportunities for effective extracurricular physical exercise and the related consciousness, leading to a significant decline in their overall fitness levels. Despite acquiring professional skills, students often struggle to implement them in practice, further exacerbating the problem.

Physical education in schools plays a crucial role in promoting moderate to vigorous physical activity while minimizing sedentary behaviors among adolescents. In addition, school-based physical education and sports programs not only offer numerous physical benefits but also contribute significantly to the development of fundamental motor skills and the comprehensive health of children [4, 5]. These activities support adolescent development in four key areas: physical, social, emotional, and cognitive. Previous studies have indicated a positive relationship between high levels of physical activity and improved academic performance among students, particularly through participation in sports teams and regular physical activities [6, 7]. Furthermore, research has demonstrated that engaging in at least three hours of physical activity per week or participating in a six-week aerobic dance program can significantly enhance oxygen consumption, muscle strength, anaerobic power, speed, and simultaneously reduce body fat and improve body shape [8, 9, 10].

Against the backdrop of traditional physical education facing difficulties in actively engaging students, the Sports Club Model has emerged as a potential solution. This modern educational model aims to provide students with more choices and create opportunities for autonomous learning, thereby promoting holistic development [11, 12]. The Sports Club Model has shown a positive effect on students' self-esteem, social development, and self-management skills, while also significantly enhancing physical and mental health [10, 13, 14, 15]. Research from Slovenia has demonstrated that students participating in sports clubs engage in twice as much physical activity compared to their non-participating peers, exceeding the recommended level of one hour per day [16].

Given the proven benefits of sports clubs in enhancing student fitness and engagement, this research aimed to explore how the Sports Club Model is applied within the context of Vietnamese educational systems, specifically at Vietnam National University, Ho Chi Minh City. The primary objective was to evaluate the effect of this model on the physical fitness improvement of female students.

This study utilized a mixed-methods approach, combining quantitative and qualitative research methodologies. Data collection included fitness assessments, surveys on student engagement in physical activities, and interviews to gather insights into students' experiences within the Sports Club Model. The research aimed to analyze changes in physical fitness levels, such as speed and muscle strength, as well as the social and emotional benefits derived from participation in sports clubs. Additionally, the study examined the implementation of physical education through sports clubs, as mandated by the Ministry of Education and Training, to understand how these programs effectively meet the physical development needs of female students.

Material and methods

Participants

The participants in this study consisted of 128 healthy female students enrolled in PE courses at VNU-HCMC. None of the participants reported any physical health issues, nor were they smokers, alcohol consumers, or under medication. The students were divided into two groups: an experimental group and a control group (Tab. 1).

Table 1. Participant Characteristics

Group	Age (years)	Height (cm)	Weight (kg)
Experimental (n = 68)	18.28 ± 0.86	158.86 ± 2.44	52.48 ± 3.16
Control (n = 60)	18.31 ± 0.72	159.08 ± 2.91	53.01 ± 4.02

The experimental group comprised 68 female students participating in a sports club-based physical education model. This group was further divided based on their chosen sports: 15 students participated in Jianzi (shuttlecock kicking), 15 in soccer, 15 in volleyball, 15 in basketball, and 8 in badminton. The training frequency was set at 3 sessions per week, with each session lasting 60 minutes.

The control group consisted of 60 female students following the standard physical education curriculum currently implemented at VNU-HCMC.

This research adhered to the ethical principles outlined in the 2008 Declaration of Helsinki. The study received ethical approval from the University Ethics Committee (Decision No. 1072.18), and all participants voluntarily signed informed consent forms prior to their involvement.

Procedure

Before the semester commenced, all participants completed a short questionnaire collecting personal information and their sports-related injury history. Any participant with significant health issues would have been excluded from the study; however, no participant was disqualified based on the responses.

Both the experimental and control groups underwent an initial physical fitness assessment (baseline test) before starting the respective physical education programs. These tests followed the regulations stipulated by Decision No. 53, issued on September 18, 2008, by the Ministry of Education and Training of Vietnam. The criteria for assessing students' physical fitness were tailored according to age and gender, ensuring high reliability in data collection [17, 18, 19, 20].

Sports Club-Based Physical Education Program

The sports club-based PE model is designed to enhance overall physical development by integrating sports training with general fitness exercises. This model allows students the flexibility to select sports that match their interests while improving core physical attributes such as speed, strength, endurance, and coordination. It encompasses both individual and team sports, providing opportunities for students to hone their personal skills while developing teamwork and strategic thinking.

Key features of this program include:

1. Comprehensive Assessment: Both initial and final assessments allow educators to track progress and evaluate the program's effectiveness, ensuring adjustments can be tailored to individual needs.

2. Theory-Practice Integration: The inclusion of theoretical sessions ensures that students gain an understanding of the fundamentals of physical training, sports techniques, and the health benefits of exercise, empowering them to make informed decisions about their fitness and well-being.

3. Focused Skill Development: Extending the duration of training in each sport to four weeks allows students to immerse themselves in mastering essential techniques. This approach contrasts with traditional PE programs, which often cover multiple sports in shorter timeframes.

4. Continuous Physical Fitness Training: The program integrates fitness components – such as speed, strength, and endurance exercises – throughout the sessions to ensure that students continually enhance their fitness alongside developing sport-specific skills.

5. Competitive Environment: Regular competitions, starting midway through the program, provide practical experience and help students apply their skills in real-world situations, boosting both physical and psychological preparedness.

This sports club-based model aligns with contemporary educational goals by not only fostering physical fitness but also promoting social and cognitive development, making it a comprehensive approach to student well-being (Tab. 2).

Control Group Physical Education Program: In contrast, the control group followed the current physical education program at VNU-HCMC, which consisted of one session per week lasting 100 minutes. This traditional program focused on a single sport throughout the semester and did not offer students the choice to select a sport based on their interests.

Statistical Methods

All statistical analyses were performed using SPSS software (version 20.0). Descriptive statistics were calculated for all variables, including means and standard deviations for continuous data such as age, height, and weight of participants. To test for normality, the Kolmogorov-Smirnov test was employed, ensuring that the data met the assumptions required for parametric testing.

The primary analyses focused on evaluating the differences between the experimental and control groups in terms of physical fitness improvements before and after the intervention. A paired-samples t-test was used to compare pre- and post-test results within each group, allowing us to assess the effectiveness

Table 2. Sports club-based physical education program structure

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Assessment	Initial Assessment														Final Assessment
General Theory	V	V	V	V											
Shuttlecock Kicking			V	V	V										
Football						V	V	V							
Volleyball									V	V	V				
Basketball												V	V	V	
Badminton															V
Basic Techniques					V	V	V	V	V	V	V	V	V	V	
Physical Development Exercises and Motor Skill Games					V	V	V	V	V	V	V	V	V	V	
Speed					V	V	V								
Strength					V	V	V								
Endurance					V	V	V								
Coordination and Flexibility					V	V	V								
Competition								V	V	V	V	V	V	V	

of both the sports club-based PE model and the traditional PE program.

To compare the overall effects between the two groups, an independent-samples t-test was conducted, determining whether the differences in physical fitness improvements were statistically significant. Additionally, a two-way repeated-measures ANOVA was conducted to examine any interaction effects between time (pre-test vs. post-test) and group (experimental vs. control) on physical fitness outcomes. A significance level of $p < 0.05$ was set for all tests to determine statistical significance. Confidence intervals (95%) were calculated where applicable to provide a range within which the true effect likely falls, offering further insight into the precision of the results.

Results

The initial physical fitness assessment of both the EG and CG revealed no statistically significant differences in fitness indicators. For all seven fitness tests, including dominant hand grip strength, sit-up repetitions, standing long jump, 30 m sprint, shuttle run (4 x 10 m), 5-minute endurance run, and flexibility (standing forward bend), the p-values exceeded 0.05. This indicates that the fitness levels of the two groups were comparable prior to the implementation of the experimental program. For instance, the dominant hand grip strength of the experimental group (M = 25.41, SD = 1.26) was not significantly different from that of the control group (M = 25.45, SD = 1.76), with a t-value of 0.108 and $p > 0.05$ confirming this similarity.

These results provide a baseline for assessing changes in physical fitness following the application of the physical education program, facilitating a comparative analysis of the program's effect on the fitness levels of both groups (Tab. 3).

Table 3. Pre-experiment physical fitness results of the experimental and control groups

	(EG: n = 68)		(CG: n = 60)		t	P
	M	SD	M	SD		
Dominant hand grip strength (kg)	25.41	1.26	25.45	1.76	0.108	>0.05
Sit-up test (reps)	17.56	1.22	17.63	1.17	0.233	>0.05
Standing long jump (cm)	152.28	4.76	150.4	4.14	1.725	>0.05
30 m sprint (sec)	6.65	0.39	6.62	0.39	0.333	>0.05
Shuttle run 4 x 10 m (sec)	13.45	1.32	13.22	1.14	0.767	>0.05
5-minute endurance run (m)	863.28	65.4	859.6	66.54	0.228	>0.05
Standing forward bend (cm)	12.93	0.5	12.89	0.6	0.32	>0.05

Note: M = Mean; SD = Standard Deviation; t = t-test statistic; P = P-value (statistical significance).

At the end of the Physical Education program (semester conclusion), a re-evaluation of physical fitness was conducted to compare the mean differences between the experimental and control groups post-intervention. The same seven tests were employed for this assessment, and the results of the independent-samples t-test are presented in Table 4.

Following the implementation of the physical education program, the assessment results indicated a significant disparity in physical fitness between the EG and the CG, with a high level of statistical significance ($p < 0.001$ for most tests). This demon-

Table 4. Post-experiment physical fitness results of the experimental and control groups

	(EG: n = 68)			(CG: n = 60)			t	P
	M	SD	W%	M	SD	W%		
Dominant hand grip strength (kg)	32.43	0.77	24.27	29.65	1.18	15.23	26.995	<0.001
Sit-up test (reps)	26.09	1.49	39.08	22.37	1.31	23.71	25.09	<0.001
Standing long jump (cm)	183.44	5.03	18.56	168.29	4.85	11.22	25.54	<0.001
30 m sprint (sec)	5.53	0.39	-18.45	5.79	0.37	-13.39	12.49	<0.001
Shuttle run 4 x 10 m (sec)	12.03	1.13	-11.15	12.379	1.22	-6.598	4.74	<0.001
5-minute endurance run (m)	925.63	70.06	6.975	908.18	62.34	5.495	3.68	<0.001
Standing forward bend (cm)	14.66	0.34	12.57	13.96	0.53	7.98	15.77	<0.001

Note: M = Mean; SD = Standard Deviation; W% = Percentage change in fitness; t = t-test statistic; P = P-value (statistical significance).

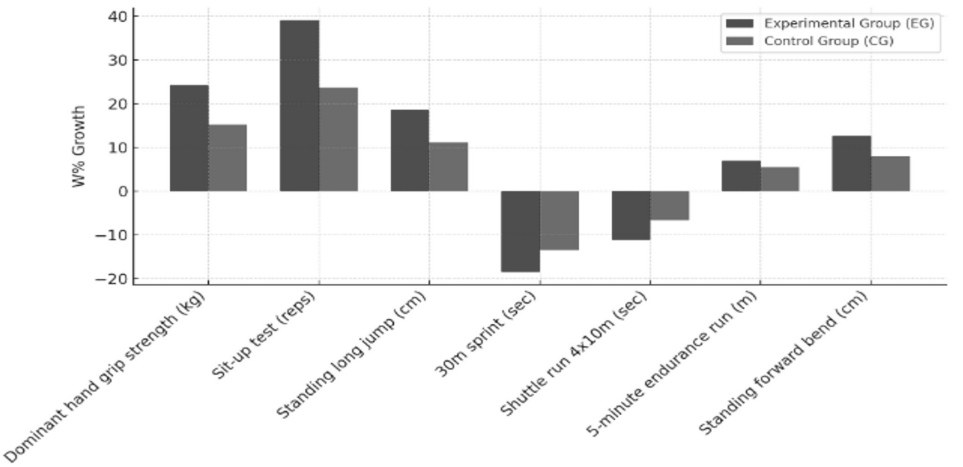

Figure 1. Comparison of the W% growth between the EG and the CG physical fitness tests

strates that the experimental program had a positive and substantial effect on the fitness levels of the experimental group.

Dominant Hand Grip Strength: The experimental group showed a significant improvement with M = 32.43 (SD = 0.77), compared to the control group's M = 29.65 (SD = 1.18). The t-value of 26.995 and p < 0.001 highlight this distinct difference.

Sit-Up Test: The experimental group exhibited a substantial increase (M = 26.09, SD = 1.49), while the control group recorded M = 22.37 (SD = 1.31). The t-test result for this test was t = 25.09 with p < 0.001, confirming the program's positive effect.

Standing Long Jump: The experimental group outperformed the control group, jumping an average of M = 183.44 cm (SD = 5.03) compared to M = 168.29 cm (SD = 4.85), with t = 25.54 and p < 0.001.

30 m Sprint: The experimental group significantly improved their sprint time (M = 5.53 seconds, SD = 0.39) in comparison to the control group (M = 5.79 seconds, SD = 0.37), with t = -18.45 and p < 0.001.

Shuttle Run (4 x 10 m): The experimental group also demonstrated enhanced speed, recording an average time of M = 12.03 seconds (SD = 1.13), while the control group had an average of M = 12.379 seconds (SD = 1.22), with t = -11.15 and p < 0.001.

5-Minute Endurance Run: The experimental group covered a greater distance (M = 925.63 m, SD = 70.06) compared to the control group (M = 908.18 m, SD = 62.34), with a t-value of 6.975 and p < 0.001.

Standing Forward Bend: The experimental group also showed significant improvement (M = 14.66 cm, SD = 0.34) compared to the control group (M = 13.96 cm, SD = 0.53), with t = 15.77 and p < 0.001.

The comparative bar chart illustrates the percentage growth (W%) in physical fitness tests between the EG and the CG. The experimental group consistently demonstrates superior performance across nearly all fitness metrics, highlighting the efficacy of the intervention.

Dominant Hand Grip Strength: The experimental group exhibits a significantly higher improvement in hand grip strength, with a 24.27% increase compared to 15.23% in the control group, underscoring the enhanced muscular development in the EG.

Sit-up Test: A notable increase of 39.08% in the EG versus 23.71% in the CG demonstrates the significant enhancement of core strength and endurance, suggesting that the intervention has a profound effect on abdominal muscle endurance.

Standing Long Jump: With an 18.56% improvement in the EG compared to 11.22% in the CG, the jump in explosive leg strength is evident, indicating greater overall gains in lower-body power for the experimental group.

30 m Sprint: Both groups showed reductions in sprint time, but the EG experienced a more substantial improvement with an 18.45% reduction in sprint time, compared to 13.39% for the CG, signifying better acceleration and speed.

Shuttle Run 4 x 10 m: The experimental group also performed better in agility and coordination, achieving an 11.15% improvement compared to 6.598% in the CG, suggesting that the program facilitated better agility and quickness in direction changes.

5-minute Endurance Run: Endurance improvement was more pronounced in the EG, with a 6.975% increase in performance, slightly higher than the 5.495% improvement seen in the CG, indicating greater cardiovascular endurance gains.

Standing Forward Bend: Flexibility improvement was also greater in the EG (12.57%) compared to the CG (7.98%), reflecting improved flexibility and mobility through the intervention.

These results strongly indicate that the experimental intervention had a significant and positive effect on physical fitness, with the experimental group outperforming the control group across all tested metrics. The findings suggest that the applied training regimen was effective in promoting comprehensive physical development.

Discussion

Our research aligns with the primary objective of determining the positive effect of sports club participation on the physical fitness of students, particularly improvements in endurance, strength, and overall fitness. As evidenced in our study and corroborated by other research [21, 22], engaging in sports clubs is strongly associated with enhanced endurance, strength, explosive power, and agility. These findings are consistent with numerous previous studies [23, 24], supporting the notion that sports participation positively influences the physical development of students.

Recent reviews, such as Golle et al. [25], highlight that environmental factors – such as living conditions in urban versus rural areas – play a significant role in physical development. Our research confirms this, demonstrating that children in urban areas who participate in sports clubs experience faster physical development, particularly in endurance, upper body strength, and lower body strength. These improvements are crucial indicators of better overall health, as demonstrated by various fitness tests (e.g., 9-minute run, 1 kg ball throw, triple jump), and reflect the need to promote engaging sports programs, particularly in rural areas.

Our findings also align with those of Minh et al. [26], who studied the effects of a 15-week basketball training program under the Sports Club Model in Vietnam. Similar to our results, Minh TT's study found significant improvements in speed, agility, and endurance compared to traditional physical education programs. However, both studies indicate that the Sports Club Model does not comprehensively affect all aspects of physical fitness, as no significant differences were found in core strength and lower-body explosive power [26].

A key unique finding of our study is its exploration of the effectiveness of the Shuttlecock Model Club (SMC) on the physical fitness and physiological functions of university female students. Thuc et al. [27] demonstrated superior improvements in speed, agility, and aerobic capacity among the experimental group, further emphasizing the potential of club-based sports programs in improving physical performance. The notable fitness gains, such as a 23.60% increase in maximal aerobic speed (MAS) in the SMC group, highlight the effectiveness of such interventions, which exceed those seen in the control group following the standard curriculum.

However, the broader implications of sports club participation extend beyond physical fitness. Several studies [28, 29] confirm that engaging in sports clubs also fosters healthier behavioral habits, including reduced screen time and better dietary practices. Moreover, sports participation is linked to improved psychological and social outcomes, such as better emotional regulation, higher self-esteem, enhanced social skills, and reduced symptoms of depression [30, 31]. These psychological and social dimensions, though not examined in our study, provide additional evidence of the comprehensive benefits of sports clubs, particularly for social development through peer and coach interactions [32, 33].

Limitations

Despite these promising results, there are several limitations to this study that must be acknowledged.

Limited Scope of Fitness Metrics: While significant improvements were observed in endurance, strength, and speed, the study did not comprehensively address other important fitness components, such as flexibility or core stability. This limitation suggests the need for more diverse training elements in future iterations of the Sports Club Model to provide a holistic approach to fitness development.

Short Duration of the Intervention: The intervention lasted for one semester, which may not be sufficient to fully assess the long-term effect of the Sports Club Model on students' fitness and overall well-being. Future studies should extend the duration of the intervention to evaluate whether the observed fitness gains can be sustained over longer periods.

Psychological and Social Outcomes Not Assessed: While the physical benefits of the Sports Club Model were clearly demonstrated, the study did not explore its psychological and social dimensions. Considering the growing body of research linking sports participation to improved mental health and social integration, future studies should include these factors to gain a more comprehensive understanding of the model's overall effectiveness.

Sample Size and Population: The study focused on a specific population of female students at a single university, which may limit the generalizability of the results. Future research should include a more diverse sample, encompassing students from various universities and regions, to assess the broader applicability of the Sports Club Model in different educational contexts

Recommendations

Expand the Range of Fitness Components: Incorporating activities that target flexibility, core strength, and coordination will help to create a more comprehensive fitness program that addresses all key areas of physical development.

Longer-Term Studies: Extending the duration of the intervention will allow for the assessment of long-term fitness outcomes and provide a clearer understanding of the sustained effect of the Sports Club Model on students' health.

Inclusion of Psychological and Social Dimensions: Future studies should evaluate the psychological and social benefits of sports participation, such as self-esteem, confidence, and social skills, to offer a more complete picture of the benefits of this model.

Wider Application and Comparative Studies: Further research should explore the model's effectiveness in different contexts, including other universities and age groups, to better understand its potential as a universal approach to improving student health and fitness.

By addressing these limitations and implementing the recommended strategies, the Sports Club Model has the potential to become a more effective and comprehensive tool for improving physical fitness and overall student well-being.

Conclusions

This study demonstrates that the Sports Club Model significantly improves physical fitness among female university students at Vietnam National University, Ho Chi Minh City. Key improvements were observed in endurance, strength, speed, and agility, with the experimental group outperforming the control group across all tested fitness parameters. The findings highlight the effectiveness of this model in fostering a more engaging and dynamic approach to physical education compared to traditional methods. By allowing students to select sports based on their interests and integrating both individual and team sports, the Sports Club Model encourages greater participation and promotes holistic physical development. The enhanced fitness outcomes, such as a 24.27% increase in grip strength and an 18.56% improvement in lower-body power (standing long jump), demonstrate the model's capacity to address the fitness needs of university students. Additionally, the improvement in cardiovascular endurance, reflected in a 6.975% increase in the 5-minute endurance run, underscores the broader health benefits of this approach.

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