

The effectiveness of the physical education curriculum following the Sports Club model on the physical development of high school students in Vietnam

Tu Tran^{1ABCDE}, Cuong Do^{1DCE}, Tien Ha^{2BE}

¹ Faculty of Physical Education and Sports, Thai Nguyen University of Education, Vietnam

² Thai Nguyen University, Vietnam

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Abstract

Background and Study Aim The physical development of high school students is often hindered by the limitations of traditional physical education programs, which may not fully engage students or promote balanced physical growth. In light of these concerns, the need to explore alternative educational models that can enhance students' physical development has become evident. The purpose of this article is to evaluate the potential effectiveness of a physical education curriculum following the Sports Club model in improving the physical development of high school students.

Material and Methods A total of 84 female 10th-grade students participated in the study. They were divided into two groups: an experimental group of 42 students following the Sports Club model and a control group of 42 students following the current physical education curriculum. The experiment lasted for 17 weeks. Both groups completed initial and final physical fitness tests. These tests included the 30-second sit-up test (to assess core strength), the 30-meter sprint test (to measure speed), the 4 × 10-meter shuttle run test (to evaluate agility), the standing long jump test (to measure explosive leg power), and the 5-minute running field test (to assess endurance).

Results The female students in the experimental group demonstrated greater physical development compared to the control group in all five assessment tests. The experimental group showed the most significant improvement in the 30-second sit-up test, with a growth rate of 26.71%. The lowest growth was observed in the 5-minute running field test, at 9.92%. In contrast, the control group showed its highest improvement in the 30-second sit-up test, with a growth rate of 9.44%. However, there was minimal to no improvement in the 4 × 10-meter shuttle run and the 5-minute running field test for the control group.

Conclusions The Sports Club model improved students' physical fitness more effectively compared to the current curriculum, offering greater benefits in all tested areas. It is recommended that teachers further integrate and refine the implementation of the Sports Club model in future physical education programs to enhance teaching effectiveness.

Keywords: curriculum, physical education, sports club model, physical fitness, high school students.

Introduction

Physical fitness among high school students is an important issue in many educational systems. Traditional physical education programs often do not fully engage students or promote balanced physical development. These programs can be limited in their ability to improve strength, endurance, and agility. As a result, many students show low levels of physical fitness and reduced interest in physical education. This situation highlights the need for more effective approaches. One possible solution is to explore alternative models, such as the Sports Club model, to better meet students' physical development needs.

Physical Education in schools is a vital channel for adolescents to engage in moderate to vigorous physical activity and reduce sedentary behavior

[1]. Furthermore, Physical Education and school sports offer numerous benefits and can significantly contribute to the development of basic motor skills and physical fitness in children. These activities also support the development of young people in four key areas: physical, social, emotional, and cognitive [2, 3]. Previous research has demonstrated a positive correlation between higher levels of physical activity and improved academic achievement in high school students, particularly through participation in sports teams and regular physical activity [4]. Additionally, studies have shown that engaging in physical activity for at least 3 hours per week or participating in a 6-week aerobic dance program leads to measurable improvements in oxygen uptake, muscle strength, anaerobic capacity, and speed, while also contributing to fat reduction and improved body aesthetics [5, 6, 7, 8]. Physical education and sports play an essential role in

promoting and maintaining students' health. They help children and adolescents enhance their physical fitness, learn important social norms, improve memory, develop self-discipline, and experience mental revitalization [9, 10, 11, 12, 13, 14]. Some studies have highlighted a noticeable increase in vigorous physical activity and participation in sports clubs among adolescents over the past decade, underscoring the growing importance of these activities [15,16]. Besides physical education classes, extracurricular sports club activities in high schools are considered another aspect of comprehensive education. These activities are distinct from 'core' and 'academic' extracurricular activities, which focus more on students' cognitive development rather than on the development of psychosocial and psychomotor areas [17].

Thus, increased levels of physical activity are associated with improvements in academic performance and the development of key physical attributes, such as strength, endurance, and speed. Furthermore, participation in sports contributes to the development of social skills, self-discipline, and enhanced emotional well-being.

Given the limitations of traditional physical education in fully engaging students, alternative approaches such as the Sports Club model (PCCM) have emerged as promising solutions. The Sports Club is a modern educational model, newly developed based on conventional Physical Education courses. It offers students more choices and facilitates autonomous learning, thus forming a student-centered technical education model [18]. The Sports Club is a valuable provider of sports, playing an important role in regular sports activities, especially for youth and competitive sports [19]. School Sports Clubs impact the self-esteem and social development of students participating in these clubs, helping them experience adolescence more positively and contributing to nurturing a positive character and stable emotional empathy among participating students [20, 21]. Sports Clubs have a significant effect on enhancing health, providing a new environment for improving overall well-being [22, 23, 24, 25, 26]. Middle and high school students involved in sports clubs have higher VO₂ max and resting lung volumes compared to students who do not participate in sports clubs. This enhances their endurance by improving respiratory function [27]. Additionally, participation in sports club activities also fosters social learning, cultural integration, and important identity development [28]. Research shows that sports clubs in Slovenia are crucial for promoting comprehensive sports activity. Most students involved in sports clubs engage in physical activity for more than the recommended 1 hour per day and are twice as active as their peers [29]. Sports clubs, as well as physical education, are recommended to be organized to provide all

young people with opportunities to learn physical activities, offering numerous chances for motor and social learning [30].

Thus, the Sports Club model presents a more flexible and student-centered approach to physical education. It promotes not only physical fitness but also social, emotional, and cognitive development. Research supports its positive impact on health, self-esteem, and social integration, making it a valuable tool for improving student well-being and participation in physical activities. Sports clubs have been shown to enhance both physical and mental development, offering students more opportunities for comprehensive growth compared to traditional physical education programs.

Building on the benefits of the Sports Club model, it is important to examine the specific impact these clubs have on students' physical fitness and overall health. Physical fitness is a collection of attributes related to health and performance, including cardiovascular endurance, muscular endurance, strength, power, body composition, flexibility, balance, agility, and reaction time [31,32]. School sports clubs significantly contribute to the development of students' physical attributes, particularly speed, strength, endurance, and motor coordination [33]. These clubs play an essential role in promoting physical activity, enhancing fitness, and reducing obesity rates among adolescents [11,34,35]. Participants in sports clubs engage in more physical activity across all age groups compared to non-participants and demonstrate higher fitness levels [36]. Participation in these clubs increases physical activity, thereby enhancing fitness and reducing the risk of obesity among elementary school students [24, 32, 37, 38]. A 2002 study indicated that the UK developed an innovative strategy linking physical education, school sports, and sports clubs. This strategy was considered groundbreaking, as it involved schools and local partners collaborating to provide comprehensive physical education and sports opportunities for students [39].

Thus, School sports clubs provide crucial benefits for students, significantly improving physical attributes and overall fitness. By encouraging greater physical activity, these clubs also help lower obesity rates. The UK's integrated strategy underscores the effectiveness of combining physical education with sports club participation for a more comprehensive approach to student health.

Given the proven benefits of sports clubs in enhancing student fitness and engagement, it is important to explore how this model is applied within specific educational systems. In Vietnam, Physical Education is a compulsory subject in the national education curriculum from grades 1 to 12. The primary goal of Physical Education is to promote health, help students choose appropriate sports

for improving fitness, and develop physical skills. According to the guidelines from the Vietnamese Ministry of Education and Training, Physical Education for high school students is implemented through sports clubs. Students can select sports activities that align with their interests and the school's capabilities, aiming to further develop health and hygiene skills, enhance awareness and athletic talents, and assist students with athletic abilities in choosing suitable career paths [40]. However, currently, high schools in Vietnam have not yet implemented the curriculum reform for physical education as outlined. Most schools still follow the old curriculum (not using the sports club model). This has significantly impacted students' learning needs, leading to a lack of interest in physical education and insufficient development of students' physical fitness. To address this issue, a new teaching curriculum has been developed using the sports club model for physical education in high schools, which is the reason for conducting this study.

Materials and Methods

Participants

The participants in this study were 84 healthy female 10th-grade students enrolled in high school Physical Education classes. None of the participants had any physical health issues, and none smoked, consumed alcohol, or were taking any medications. The students were divided into two groups: an experimental group and a control group (Table 1).

The experimental group consisted of 42 female students, participating in the Sports Club model (PCCM) with specific involvement as follows: 10 students in football, 10 in volleyball, 11 in basketball, and 11 in badminton. The control group also consisted of 42 female students, who followed the standard 10th-grade Physical Education curriculum currently applied in their high school.

All participants were informed about the testing procedures and provided written consent prior to the study. This research was approved by the Councils of the High School for use with the students.

Table 1. Subject features (n=84)

Group	Age (years old)	Height (cm)	Weight (kg)
Experimental (n=42)	15.32 ± 0.52	159.90 ± 4.78	53.68 ± 4.13
Control (n=42)	15.76 ± 0.61	160.02 ± 4.96	54.12 ± 4.68

Procedure

Before the start of the semester, all participating students completed a brief questionnaire regarding their personal information and history of sports-related injuries. Participants with any issues

would have been excluded from the study, but no students were disqualified based on the results. Next, all students in both the experimental and control groups underwent an initial physical fitness test (the first test) before the Physical Education curriculum began. These tests were conducted in accordance with Decision 53/2008/QĐ-BGDĐT, dated September 18, 2008, issued by the Ministry of Education and Training, which provides regulations for assessing and grading students' physical fitness by age and gender, ensuring high reliability [41]. Five physical fitness tests were selected to assess the students' fitness: the 30-second sit-up test (to evaluate core strength), the 30-meter sprint test (for speed), the 4 × 10-meter shuttle run test (for agility), the standing long jump test (to measure explosive leg power), and the 5-minute running field test (to assess endurance). These tests are appropriate for evaluating physical fitness according to the high school Physical Education curriculum [42, 43]. Afterward, students in both groups participated in a 17-week Physical Education curriculum (equivalent to one semester) under the same conditions, including class time, use of facilities, weather, and climate. At the end of the semester, both groups underwent a second physical fitness test (post-experiment) using the same five tests as in the initial assessment.

The Physical Education curriculum follows the Sports Club model (PCCM)

The Sports Club model (PCCM) lasts for 17 weeks (equivalent to one semester), with one session per week, each session lasting 90 minutes. It covers five components: General Theory, Basic Techniques, Games, Physical Fitness, and Competitions (Table 2). The selected content is fundamental, popular, and suitable for the students' age, gender, health, physical fitness, and regional characteristics. It is designed to align with the school's facilities and the teachers' capabilities. The curriculum aims to develop physical qualities such as speed, strength, endurance, coordination, and flexibility. PCCM includes sports such as football, volleyball, basketball, and badminton. Students can choose their preferred sport for training. The training method emphasizes active student engagement, with a balanced combination of group training and individual practice to ensure adequate physical activity. Various games and competitions are incorporated to make the training attractive and engaging for students. The curriculum also encourages students to manage, self-direct, and participate in peer evaluations. In contrast, the current Physical Education curriculum for 10th-grade students (control group) consists of two sessions per week, each lasting 45 minutes. This curriculum focuses on a single sport, without allowing students to choose their preferred activity.

Table 2. The Physical Education Curriculum following the Sports Club model (PCCM)

Weeks	Test	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Test
General theory																			
Football		x	x	x															
Volleyball		x	x	x															
Basketball		x	x	x															
Badminton		x	x	x															
Basic Techniques																			
Football		x	x	x	x	x	x	x	x	x	x	x							
Volleyball		x	x	x	x	x	x	x	x	x	x	x							
Basketball		x	x	x	x	x	x	x	x	x	x	x							
Badminton		x	x	x	x	x	x	x	x	x	x	x							
Games and Physical Fitness																			
Speed					x		x		x		x			x					
Strength						x		x		x		x							
Endurance						x		x		x		x		x	x	x	x	x	x
Coordination					x		x		x		x		x	x	x	x	x	x	x
Flexibility						x		x		x		x		x					
Competition																			
Football													x	x	x	x	x	x	
Volleyball													x	x	x	x	x	x	
Basketball													x	x	x	x	x	x	
Badminton													x	x	x	x	x	x	

The main focus is on the techniques of that specific sport, which are used to assess students' end-of-term grades.

Statistical Analysis

The statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) for Windows, version 20. An independent samples t-test was used to evaluate the differences in each physical fitness test between the experimental and control groups. A paired samples t-test was applied to determine the differences between pre-test and post-test results within each group. The significance level was set at $p < 0.05$.

Results

To establish a basis for evaluating the physical development of students, a pre-experiment physical fitness test was conducted for both the experimental and control groups to allow for comparison. The results are presented in Table 3. Table 3 shows the mean differences in physical fitness between the control and experimental groups of 10th-grade female students before the implementation of the Sports Club model (PCCM). There were no significant differences in any of the physical fitness tests (standing long jump, 30-meter sprint, 30-second

sit-up test, 4×10 -meter shuttle run, 5-minute running field) between the two groups, with $p > 0.05$. This indicates that the fitness levels of the two groups were comparable. Thus, the implementation of the 17-week Physical Education curriculum could proceed for each specific group.

At the end of the Physical Education curriculum (semester end), the study reassessed physical fitness to compare the mean differences between the experimental and control groups post-experiment. The same five tests were used as in the initial assessment. The results of the independent samples t-test for these comparisons are presented in Table 4.

Table 4 shows a significant difference in physical fitness between the control and experimental groups of 10th-grade female students after the 17-week Physical Education curriculum. Post-experiment, the average values in all five physical fitness tests - explosive leg strength (standing long jump test), speed (30-meter sprint test), core strength (30-second sit-up test), agility (4×10 -meter shuttle run test), and endurance (5-minute running field test)—were significantly higher in the experimental group compared to the control group, with $p < 0.001$. These results indicate that the Sports Club model (PCCM) had a positive impact on all five

Table 3. The results of the independent samples t-test for the physical fitness of experimental and control groups before the experiment

Test	Groups	N	M ± SD	t-Value	p-Value
Standing long jump (cm)	Experimental	42	148.40 ± 7.19	-0.291	.772
	Control	42	148.83 ± 7.73		
30-m sprint (s)	Experimental	42	7.09 ± 0.44	0.216	.830
	Control	42	7.07 ± 0.45		
30-s sit-up test (times)	Experimental	42	12.98 ± 1.66	0.924	.361
	Control	42	12.57 ± 1.74		
4 × 10-m shuttle run (s)	Experimental	42	13.16 ± 0.40	0.157	.876
	Control	42	13.15 ± 0.38		
5-min running field (m)	Experimental	42	796.90 ± 21.15	-0.539	.593
	Control	42	799.76 ± 27.12		

Note: M: Mean; SD: Standard deviation

Table 4. The results of the independent samples t-test for the physical fitness of experimental and control groups after the experiment

Test	Groups	N	M ± SD	t-Value	p-Value
Standing long jump (cm)	Experimental	42	172.98± 8.04	11.360	.000
	Control	42	153.00 ± 7.61		
30-m sprint (s)	Experimental	42	6.24 ± 0.33	-11.384	.000
	Control	42	6.87 ± 0.15		
30-s sit-up test (times)	Experimental	42	17.71 ± 2.48	7.517	.000
	Control	42	13.88 ± 1.55		
4 × 10-m shuttle run (s)	Experimental	42	11.97 ± 0.97	-7.226	.000
	Control	42	13.10 ± 0.22		
5-min running field (m)	Experimental	42	884.64 ± 20.91	19.783	.000
	Control	42	802.26 ± 18.09		

Note: M: Mean; SD: Standard deviation

physical fitness qualities, contributing to balanced, harmonious, and comprehensive development in the students.

The comparison of physical fitness results for the experimental and control groups before and after the 17-week Physical Education curriculum, using the paired samples t-test, is presented in Table 5.

Table 5 shows the differences in physical fitness results for female 10th-grade students before and after the 17-week Physical Education curriculum in both the control and experimental groups. In the experimental group, there was a significant difference between pre-test and post-test results across all physical fitness tests, with $p < 0.001$. The growth rates in physical fitness were particularly high, with the largest increase observed in the 30-second sit-up test (26.71%). This was followed by

the standing long jump test (14.21%), the 30-meter sprint test (13.62%), the 4 × 10-meter shuttle run test (9.94%), and the 5-minute running field test, which had the lowest growth rate at 9.92%. In the control group, there were also differences between pre-test and post-test results, but only three tests showed significant changes: the standing long jump test (explosive leg strength), the 30-meter sprint test (speed), and the 30-second sit-up test (core strength), all with $p < 0.05$. The remaining two tests, the 4 × 10-meter shuttle run test (agility) and the 5-minute running field test (endurance), did not show significant differences ($p > 0.05$). Although the control group also experienced improvements in physical fitness after the experiment, the extent of improvement was relatively low. The highest increase in the control group was observed in the

Table 5. The results of the paired samples t-test of experimental and control groups before and after the experiment

Test	Pre – test (M ± SD)	Post – test (M ± SD)	t-Value	p-Value	Percentage of change (%)
Groups Experimental					
Standing long jump (cm)	148.40 ± 7.191	172.98 ± 8.04	-16.798	.000	14.21
30-m sprint (s)	7.09 ± 0.44	6.24 ± 0.33	9.907	.000	13.62
30-s sit-up test (times)	12.98 ± 1.66	17.71 ± 2.48	-11.465	.000	26.71
4 × 10-m shuttle run (s)	13.16 ± 0.40	11.97 ± 0.97	7.848	.000	9.94
5-min running field (m)	796.90 ± 21.15	884.64 ± 20.91	-19.934	.000	9.92
Groups Control					
Standing long jump (cm)	148.83 ± 7.73	153.00 ± 7.61	-3.193	.003	2.73
30-m sprint (s)	7.07 ± 0.45	6.87 ± 0.15	2.726	.009	2.91
30-s sit-up test (times)	12.57 ± 1.74	13.88 ± 1.54	6.440	.000	9.44
4 × 10-m shuttle run (s)	13.15 ± 0.38	13.10 ± 0.22	0.767	.448	0.38
5-min running field (m)	799.76 ± 27.12	802.26 ± 18.09	-0.491	.626	0.31

Note: M: Mean; SD: Standard deviation

30-second sit-up test (9.44%). Other tests showed minimal improvements, such as the 30-meter sprint test (2.91%) and the standing long jump test (2.73%), while the 4 × 10-meter shuttle run test and the 5-minute running field test showed negligible increases of 0.38% and 0.31%, respectively.

This means that both curricula impact the physical fitness of female 10th-grade students. However, the newly developed Sports Club model (PCCM) shows higher effectiveness, as evidenced by greater growth in physical fitness (Figure 1), with a more consistent impact across all five tests. In contrast, the current Physical Education curriculum also affects the physical fitness of female 10th-grade students but does so unevenly across the five tests, resulting in lower overall effectiveness and less improvement in physical fitness.

Discussion

The purpose of this article is to evaluate the potential effectiveness of a physical education curriculum following the Sports Club model (PCCM) in improving the physical development of high school students. The research results demonstrate that PCCM has a positive impact on the physical fitness of female high school students in Vietnam.

After 17 weeks of implementing PCCM, the average values in all five physical fitness tests for the experimental group were significantly better than those of the control group, with $p < 0.001$ (independent samples t-test). The paired samples t-test also showed significant differences between pre-test and post-test results in all physical fitness tests for the experimental group, with $p < 0.001$. The growth rates were notably high across all five physical fitness tests, with the highest increase in the 30-second sit-up test (core strength) at 26.71%. This was followed by the 30-meter sprint test (speed) at 13.62%, the 4 × 10-meter shuttle run test (agility) at 9.94%, the standing long jump test (explosive leg power) at 14.21%, and the lowest increase in the 5-minute running field test (endurance) at 9.92%.

The control group, which followed the current Physical Education curriculum, also showed differences in physical fitness between the pre-test and post-test after 17 weeks. However, only three tests showed significant improvements: the standing long jump test (explosive leg strength), the 30-meter sprint test (speed), and the 30-second sit-up test (core strength), with $p < 0.05$. The other two tests, the 4 × 10-meter shuttle run test (agility) and the 5-minute running field test (endurance), did

not show significant differences, with $p > 0.05$. The growth rates in physical fitness for the control group were very low. The highest increase was 9.44% in the 30-second sit-up test, while the lowest was 0.31% in the 5-minute running field test. The other tests showed increases of less than 3%. The new PCCM curriculum, which includes four sports: football, volleyball, badminton, and basketball, offers a more diverse training experience. It significantly enhances students' physical fitness. In contrast, the current curriculum focuses on only one sport and places less emphasis on physical fitness training. This results in lower overall effectiveness.

Our findings align with several intervention studies that have shown that participation in sports clubs leads to improved physical fitness. This improvement is particularly notable in endurance and strength, as evidenced in Tahira's research [11]. Participation in sports clubs is also associated with higher physical fitness in terms of endurance, strength, power, and agility, as highlighted in the research by Drenowatz and colleagues [35]. Some previous studies share similar views with our research. They demonstrate a positive relationship between sports participation and the physical development of students [6, 36, 37, 44].

A study by Golle et al. [38] indicated that physical development is positively influenced by both the living environment and participation in sports clubs. Specifically, children living in urban areas and those participating in sports clubs were found to be healthier and showed faster physical development compared to children living in rural areas. This was evident in measures of endurance (9-minute run), upper body strength (1 kg ball lift), and lower body strength (triple jump test). The authors recommend that sports club programs, offering engaging activities, could be an effective means to enhance physical fitness in children living in rural areas [38].

A study in Vietnam also assessed the effectiveness of a 15-week basketball training curriculum following the Sports Club model (BPCM) for female students at Saigon University [45]. The research team used five physical fitness tests, as outlined by the Ministry of Education and Training [41], consistent with those used in our study. The results indicate that the 15-week BPCM training curriculum led to higher scores in speed (30-meter sprint test), agility (4×10 -meter shuttle run test), and maximal aerobic capacity (5-minute running field test) compared to the current program. However, there were no significant differences in core strength (30-second sit-up test) and explosive leg power (standing long jump test) between the BPCM program and the current curriculum [45]. This suggests that the BPCM program did not have a comprehensive impact on the overall physical fitness of the participants. The potential reasons for this could include differences in the characteristics

of the study subjects or a lack of diversity in the sports activities included in the program.

In a previous study, we assessed the effectiveness of cooperative teaching in Physical Education on the physical development of high school students [42]. In that study, we also used five physical fitness tests, as outlined by the Ministry of Education and Training [41]. The results indicated that the innovative teaching method (cooperative learning) had a positive impact on all five physical fitness tests: the 30-second sit-up test, 30-meter sprint test, 4×10 -meter shuttle run test, standing long jump test, and 5-minute running field test. Students in the experimental group showed higher growth rates in physical fitness compared to the control group. These findings are consistent with our current research, likely due to the shared focus on innovating Physical Education teaching in secondary schools and the similar target group of high school students.

A study by Vicente-Rodriguez G and colleagues demonstrated that students who participated in football training within a sports club experienced increased bone mass, reduced fat mass, and increased lean body mass. Additionally, they achieved better results in physical fitness tests, including the 30-meter sprint, 300-meter run (anaerobic capacity), and 20-meter shuttle run (maximum aerobic power) [46]. These results align with our study in terms of physical fitness development in areas such as speed, agility, and endurance. However, core strength and explosive leg power have not yet been evaluated.

Basterfield et al. [32] also demonstrated that participation in sports clubs is positively associated with body mass index (BMI) and particularly benefits physical fitness development. This was evident through several tests, including the 20-meter shuttle run test (20mSRT), handgrip strength (Handgrip), standing broad jump (Broad Jump), and sit-and-reach [32]. These results are similar to our research in terms of physical fitness assessments, such as agility and explosive leg power. However, their study did not fully evaluate speed, core strength, and endurance.

Brettschneider demonstrated the impact of sports club activities on the physical development of youth in Germany [33]. These results align with our study in showing the positive impact of sports club activities on strength (standing broad jump) and endurance (6-minute run test). However, their study did not fully assess other aspects of physical fitness, such as speed, core strength, and explosive leg power. The lack of comprehensive evaluation may be attributed to differences in the research subjects.

Additionally, other studies have shown that participation in sports clubs is beneficial for various health behaviors, such as reduced screen time, healthier eating habits, and decreased substance

abuse. Participation in sports clubs is often considered a key factor for a healthier lifestyle during childhood and adolescence, beyond the impact on body weight alone [47, 48]. Furthermore, there is evidence that the psychological and social benefits of participating in sports exceed those of other forms of physical recreation. Specifically, engaging in sports is associated with better emotional regulation, higher self-esteem, increased confidence, and greater competence. It also correlates with improved social skills and fewer symptoms of depression [20, 49]. In practice, it is argued that participation in sports clubs, especially team sports, is a crucial component of children's social development due to interactions with coaches and peers [50, 51]. However, these aspects of overall health were not considered in our study.

Our study highlights the benefits of innovating the Sports Club model (PCCM) in developing physical fitness among high school students, particularly female students in Vietnam. Students participating in PCCM demonstrated better physical fitness across all five tests. Therefore, we recommend enhancing the implementation of the Sports Club model in high schools in Vietnam and tailoring programs to students' levels to achieve optimal results.

However, it is important to acknowledge some limitations of the study. First, the sample was limited to female students, which may restrict the generalizability of the findings to the broader student population, including male students. Second, the study focused on a specific set of physical fitness tests, which may not fully capture other important dimensions of physical development, such as flexibility or balance. Additionally, factors such as the students' socioeconomic background,

prior physical activity experience, and motivation were not controlled, which could have influenced the results.

Future research should aim to include a more diverse sample of students and explore a wider range of physical fitness metrics. Longitudinal studies would also be valuable to assess the long-term effects of PCCM on students' physical and mental well-being. Furthermore, investigating the impact of different sports and training intensities within the PCCM framework could help optimize the curriculum for various student needs.

Conclusions

This study underscores the significance of innovating physical education through the Sports Club model (PCCM) to improve physical fitness among high school students, particularly female students in Vietnam. The PCCM approach offers a more diverse and engaging training experience, allowing students to participate in multiple sports and benefit from a well-rounded physical education program. The adoption of this model can contribute to better physical development and overall well-being, addressing the limitations of traditional physical education programs.

The Sports Club model promotes active student participation, fosters autonomy, and encourages peer interaction, creating a more dynamic learning environment. Implementing PCCM more widely in schools can lead to more effective outcomes, ensuring that physical education is better aligned with students' needs and interests. By continuing to develop and refine such innovative approaches, schools can significantly enhance the physical fitness and engagement of their students.

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Information about the authors:

Tu Tran; <https://orcid.org/0000-0002-9115-7227>; tutt@tnue.edu.vn; Faculty of Physical Education and Sports, Thai Nguyen University of Education; Vietnam.

Cuong Do; (Corresponding author); <https://orcid.org/0009-0000-7601-356X>; cuongdn@tnue.edu.vn; Faculty of Physical Education and Sports, Thai Nguyen University of Education; Vietnam.

Tien Ha; <https://orcid.org/0009-0005-0996-5508>; tienhq@tnu.edu.vn; Thai Nguyen University; Vietnam.

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