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Selection of general fitness development exercises for first year female students of Duy Tan University (Vietnam)

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ABSTRACT

The aim of this study was to select and evaluate exercises designed to develop general fitness for first-year female students. A randomized controlled trial design (parallel design) was employed. The research methods included document analysis and synthesis, interviews, pedagogical observation, pedagogical examination, pedagogical experiments, and statistical analysis. A total of 200 first-year female students enrolled in the Physical Education Program at Duy Tan University in Da Nang City participated. They were divided into two groups by random drawing by class: the experimental group (N=100) and the control group (N=100). The experimental group followed the Physical Education program at Duy Tan University with the addition of the selected exercises and modifications, while the control group followed the standard General Physical Education program. The researcher selected 28 exercises categorized into two groups: Group 1 (exercises with limited movement, 23 exercises) and Group 2 (exercises measuring each part of movement, 5 exercises). The results showed significant improvements in all tested fitness parameters for the experimental group compared to the control group ($p<0.05$). Additionally, the achievement growth rate in all tests assessing general fitness was higher for the experimental group ($p<0.05$). The initial application and evaluation of these exercises demonstrated high efficiency in improving the general fitness of the first-year female students.

KEYWORDS

Exercise; General Fitness Development; Female Students; Duy Tan University

1. INTRODUCTION

Almost one-third (31%) of the global adult population, equating to 1.8 billion individuals, are physically inactive (Strain et al., 2024). According to World Health Organization (2024), physical activity is any movement produced by skeletal muscles that requires energy expenditure. This includes all types of movement, whether during leisure time, for transportation, or as part of work or household tasks. Both moderate- and vigorous-intensity physical activities enhance health. Common ways to stay active include walking, cycling, wheeling, sports, active recreation, and play, all of which can be enjoyed by people of all skill levels (WHO, 2024).

Regular physical activity in adults and older adults reduces the risk of all-cause mortality, cardiovascular disease mortality, hypertension, site-specific cancers, type-2 diabetes, and falls. It also enhances mental health, cognitive health, sleep quality, and body fat measures. Conversely, sedentary behavior and inactivity increase the risks of these adverse health outcomes (WHO, 2024).

Physical activity (PA) includes exercise, sports, and activities carried out in daily life, work, leisure, or active transportation. On the other hand, exercise is a subset of PA characterized by being planned, structured, and repetitive, aimed at improving or maintaining physical fitness as its primary or secondary goal (Garber et al., 2011).

Exercise and physical activity can be categorized into four main types: endurance, strength, balance, and flexibility. Many individuals tend to concentrate on just one type of exercise, believing it is sufficient for their health. However, each category offers unique benefits, and incorporating all four types into your routine can provide additional advantages (Elmagd, 2016).

Among students enrolled in physical education programs, many female students exhibit weak overall fitness, which compromises their health during practical training programs (Lam et al., 2000). This issue is particularly prevalent among first-year female students. Improving their general physical fitness is essential, as it helps them meet the requirements of the physical education curriculum and establishes a health foundation necessary for successfully completing their specialized training programs (Hiep & Uyen, 2000).

The role of general fitness in maintaining and improving health for practitioners, including students, has garnered significant research interest from numerous authors (Hoa, 2007; My, 2005; Tuyen, 2006; Thuy, 2001; Thu, 2018; Vu, 2015; Hop, 2021). However, there is a notable gap in research concerning the selection and application of general physical development exercises specifically for first-year female students at Duy Tan University in Da Nang City. Therefore, the aim

of this study is to select exercises designed to develop general fitness for first-year female students and to evaluate the effectiveness of these exercises.

2. METHODS

2.1. Study Design and Participants

This study used a randomized controlled trial design (parallel design). A total of 200 first-year female students studying in Physical Education Program at Duy Tan University in Da Nang city, participated in this study.

During the research process, the researcher also employed the following methods: analysis and synthesis of documents, interviews, pedagogical observation, pedagogical examination, pedagogical experiments, and statistical analysis (t-test) (Lam & Thanh, 2007; Van, 2000).

2.2. Procedure for Selecting Exercises

The selection of exercises to develop general fitness for first-year female students at Duy Tan University in Da Nang City involved several key steps: reviewing relevant literature and documents (Trieu & Tho, 2000; Toan & Ton, 2000), integrating insights from pedagogical supervision, conducting large-scale surveys through interviews and questionnaires, and consulting directly with Physical Education lecturers from Duy Tan University and neighboring universities. These steps ensure a comprehensive approach to identifying and selecting effective exercises that cater to the specific needs and fitness goals of the students.

2.3. Intervention

The experimental period was from 9/2021 to 6/2022. A total of 200 first-year female students were divided into 2 groups by random drawing by class: experimental group (N=100) and control group (N=100).

- **Experimental Group**: This group consisted of 100 first-year female students. This group followed the Physical Education program alongside the control group, with the general physical development component of each lesson plan incorporating the selected exercises and modifications developed during the research.

- **Control Group:** This group consisted of 100 first-year female students. This group followed the standard General Physical Education program currently offered at Duy Tan University in Da Nang City.

3. RESULTS AND DISCUSSION

We selected 28 exercises to develop general physical strength for first-year female students. These exercises are categorized into two groups:

1. Group of exercises that strictly limit the amount of movement (23 exercises):

- Strength training exercises (5 exercises)
- Strength training (5 exercises)
- Strength training exercises (5 exercises)
- Exercises to develop motor coordination (5 exercises)
- Flexibility development exercises (3 exercises)

2. Group of exercises to measure each part of movement (game: 5 exercises).

To determine the effectiveness of the selected exercises, we evaluated the results based on tests and assessments aligned with the physical fitness content and standards established by the Ministry of Education and Training (Decision No. 53/2008/QD–BGDĐT) (Ministry of Education and Training, 2015; Program of Physical Education in Professional Intermediate Schools, 2006).

Based on the content of the Physical Education program for first-year students of Duy Tan University, Da Nang city (60 periods), we proceed to build an experimental process of the selected exercises in both semesters within the regular class hours for the target audience. The details of the experimental process are outlined in Table 1.

Table 1. The selected 28 exercises

	months / **Contents of exercises**	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**
1	Jump rope speed 10s x 3 groups, rest 1 minute between groups	x				x				
2	Jump Adam 10s x 3 nests, rest 1 minute in between		x				x			
3	Running 30m, starting high x 3 groups, resting 1 minute between groups			x				x		
4	Turn on the platform to change legs 10s x 3 groups, rest for 1 minute in the middle				x				x	
5	Run and change direction according to the signal 10s x 3 groups, rest 1 minute between groups	x					x			
6	Lie on your back with sit-ups 30 times x 2 nests, rest 2 minutes between groups		x					x		
7	Lie on your stomach 30 times x 2 nests, rest for 2 minutes between groups			x		x			x	
8	Jumping and pulling high knees continuously for 15 seconds x 3 groups, resting for 1 minute in the middle				x					x
9	Stork 1 foot 20m x 3 nests, rest 2 minutes in between nests	x					x			
10	Jumping 20m x 2 nests, resting 3 minutes between nests			x				x		
11	Run 400m x 2 groups, rest 2 minutes in between groups		x						x	
12	Run 800m, do it once				x					x
13	Jump rope 3 minutes, do 1 time	x				x				
14	Run 1200m variable speed, do 1 time		x				x			x
15	Abdominal muscles at maximum strength, performed 1 time				x				x	
16	Double jump 15 times x 2 groups, rest 1 minute in between sets			x				x		
17	Run zigzag 30m x 3 groups, rest 2 minutes in between groups	x				x				
18	Coordinate jumping and pulling knees 5 times, push-ups 3 times, running at high speed 10mx3 times, resting 1 minute in between.			x		x				x
19	Move 2m forward, 1m back, 2m forward again, 1m back, and 10m x 3 high-speed javelin, resting 1 minute between groups				x		x		x	
20	Jumping and jumping in place 3 times, bending body in place 3 times and running at high speed 10m x 3 nests, resting for 1 minute in between groups	x	x					x		
21	Vertical press – vertical split 2 minutes				x				x	

22	Horizontal press – horizontal split 2 minutes			x			x					
23	Flexibility (bending front, left - right) và ưỡn thân sau) 2 phút		x			x			x			
24	The 3rd Leftover Game	x						x				
25	Volleyball Game 6			x		x		x				
26	Chess game		x				x					
27	Quick Passing Game	x			x		x			x		
28	Short distance chase game			x		x			x			

Before the intervention, we assessed the general fitness level of the experimental subjects according to the physical fitness criteria specified in Decision No. 53/2008/QD-BGDĐT. This assessment served as a basis for comparing and evaluating the similarity between the experimental and control groups and for measuring the effectiveness of the exercises post-experiment. The results of the pre-experiment test indicated no statistical difference between the two groups, with t-values being less than the critical value at a probability threshold of $P > 0.05$. This demonstrates that the general fitness levels of both groups were equivalent, ensuring the classification was objective.

After completing the experimental process, we conducted a final assessment of the general fitness level based on the established fitness classification standards. Table 2 presents a comparison of the general fitness level test results between the experimental group and the control group following the experiment. The results show that the experimental group exhibited significant improvements across all tested fitness parameters compared to the control group ($p<0.05$), highlighting the effectiveness of the selected exercises in enhancing general physical fitness (Table 2). The results emphasize the importance of a structured and well-designed exercise regimen for developing general fitness. Regular activities alone may not be adequate for substantial fitness improvements.

Table 2. Comparison of the results of the general fitness level test after the experiment of the experimental group and the control group

	Test	Standards of body training reach level	Test results			
			Control group (n=100) (**M**±SD)	Experimental group (n=100) (**M**±SD	t-value	p-value
1	Hand squeeze force (kg)	≥26.70	26.86±5.62	29.48±1.68	3.15	<0.05
2	Lie on your back (times/30 s)	≥16	15.96±2.72	18.96±1.09	2.99	<0.05
3	Thrust in place (cm)	≥153	152.36±5.98	176.95±9.39	3.25	<0.05
4	Run 30m high start (s)	≤6.70	6.65±0.74	6.12±0.25	2.65	<0.05
5	Run the shuttle 4x10m(s)	≤13.00	13.06±1.34	12.73±0.56	2.65	<0.05
6	Run according to strength 5 minutes (m)	≥870	871.43±12.27	891.62±12.43	3.01	<0.05

The achievement growth rate in all tests assessing the general fitness level was higher for the experimental group compared to the control group, thus indicating the selected exercises' effectiveness in enhancing general physical fitness (Table 3). The higher growth rate confirms that the exercise program had a significant impact on fitness levels, affirming its role in improving physical fitness among the participants. Given the positive outcomes, it is advisable to continue using and potentially expanding the exercise program for other student groups or populations.

Table 3. Growth rate of experimental and control groups over experimental periods

	Test	Experimental group (**M**±SD)		W%	Control group (**M**±SD)		W%
		Before the experiment	After the experiment		Before the experiment	After the experiment	
1	Hand squeeze force (kg)	27.78±1.95	29.4±1.68	8.17	26.77±5.83	26.86±5.62	2.17
2	Lie on your back (times/30 s)	15.56±1.13	18.96±1.09	8.49	15.56±2.77	15.96±2.72	2.48
3	Thrust in place (cm)	146.35±11.16	176.9±9.39	9.03	146.36±18.34	152.36±5.98	3.03
4	Run 30m high start (s)	6.75±0.47	6.12±0.25	11.68	6.73±0.75	6.65±0.74	2.69
5	Run the shuttle 4x10m(s)	13.23±0.96	12.73±0.56	9.18	13.22±1.58	13.06±1.34	1.17
6	Run according to strength 5 minutes (m)	857.63±62.26	891.62±12.43	9.84	855.45±92.18	871.43±12.27	2.74

4. CONCLUSIONS

The study led to the selection of 28 exercises to develop general physical strength for first-year female students at Duy Tan University in Da Nang City. These exercises were categorized into two groups: 23 exercises with limited movement, including strength training, motor coordination development, and flexibility exercises, and 5 game-based exercises to measure various movement aspects. The initial application and evaluation of these exercises demonstrated high efficiency in improving the general fitness of the students. Based on these findings, it is recommended to integrate these exercises into the regular physical education curriculum to sustain and further enhance students' fitness levels. Further research could explore the long-term impact of these exercises on students' overall health and academic performance.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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