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Baseline general physical fitness of non-specialized university students before a basketball course: A cross-sectional study at Saigon University

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Abstract
Background: Physical education (PE) curricula in team sports like basketball assume a foundational level of general physical fitness (GPF) for safe skill acquisition. However, empirical data on baseline GPF among Vietnamese non-specialized university students are scarce. This study had two objectives: first, to describe the baseline physical fitness of students before taking a basketball course at Saigon University (SGU); second, to compare fitness levels between male and female participants.
Methods: A cross-sectional study included 465 second-year students (369 females, 96 males). Six fitness components were assessed using standardized tests: handgrip strength, 30-second sit-ups, standing long jump, 30 m sprint, 4×10 m shuttle run, and 5 min run. Independent t-tests (or Mann-Whitney U tests) with Cohen's d effect sizes were used for sex comparisons.
Results: Female students (n = 369) achieved mean values of 28.75 ± 2.89 kg for handgrip strength, 156.90 ± 7.82 cm for standing long jump, 15.44 ± 1.89 repetitions for 30-second sit-ups, 13.22 ± 0.85 s for the 4×10 m shuttle run, 6.12 ± 0.94 s for the 30 m sprint, and 839.60 ± 25.40 m for the 5-minute run. Male students (n = 96) achieved 41.06 ± 2.71 kg, 214.20 ± 15.80 cm, 19.79 ± 0.89 repetitions, 13.16 ± 0.86 s, 5.38 ± 0.26 s, and 972.52 ± 14.10 m, respectively. Statistically significant sex differences were found for 5 out of 6 fitness tests ($p < 0.001$), with very large effect sizes for handgrip strength ($d = 4.31$) and standing long jump ($d = 4.65$). No significant difference was observed for the 4×10 m shuttle run ($p = 0.563$).
Conclusion: Baseline GPF values of SGU students were lower than Vietnamese national standards and values reported for general student populations in other countries. Curriculum design should integrate targeted preconditioning protocols, with attention to cardiorespiratory endurance in females and agility/speed in males.

Keywords: Physical fitness, university students, basketball, sex differences, physical education, Vietnam

Introduction

Basketball is an intermittent high-intensity sport requiring cardiorespiratory endurance, agility, speed, and strength (Delextrat & Cohen, 2008; Stojanović *et al*., 2018) [6, 16]. Within universities, it is a common component of physical education (PE) programs. At Saigon University (SGU), basketball is offered as a 2-credit elective course, "Basketball 1" for non-specialized students.

Students typically need a certain level of basic fitness before they can learn sport-specific skills effectively. Without adequate fitness, students may experience fatigue, poor skill acquisition, and increased injury risk (Hootman *et al*., 2007) [8]. Vietnamese youth face challenges from sedentary behavior, particularly following pandemic-related lifestyle changes (Stockwell *et al*., 2021) [15]. In Vietnam, previous studies (e.g., Trinh, 2022; Ly, 2022) [10] have mainly looked at how to improve basketball skills using specific drills. Few have measured students' fitness levels before a course actually starts. Therefore, this study aimed to (1) describe the baseline GPF of male and female students enrolling in Basketball 1 at SGU and (2) compare their fitness levels.

Methods

1. Study Design and Participants

This cross-sectional study was conducted at Saigon University, Ho Chi Minh City, at the start of the 2025–2026 academic year. The research protocol received ethical approval from the Research Ethics Committee of Saigon University (reference number: CSB2024-18). Using simple random sampling, 480 students were recruited from 12 Basketball 1 classes. Exclusion criteria included musculoskeletal injury, acute illness, or use of neuroactive medication. The final sample comprised 465 students (369 females, 96 males). All participants provided written informed consent.

2. Procedures and Physical Fitness Tests

Tests were administered by trained PE instructors during the first course week, before any basketball-specific training. The test battery followed the Vietnamese Ministry of Education and Training (MoET) Decision No. 53/2008[12]/QĐ-BGDĐT (Ministry of Education and Training [Vietnam], 2008) [12], assessing:

- **Handgrip strength (kg):** Dominant hand, digital dynamometer (TKK 5001, Japan); best of three trials (Roberts *et al*., 2011) [13].
- **30-second sit-ups (reps):** Muscular endurance (American College of Sports Medicine [ACSM], 2013) [1].
- **Standing long jump (cm):** Explosive power; best of two attempts (Markovic *et al*., 2004) [11].
- **30 m sprint (s):** Linear speed (Little & Williams, 2005) [9].
- **4×10 m shuttle run (s):** Agility (Sheppard & Young, 2006) [14].
- **5-minute run (m):** Cardiorespiratory endurance, adapted from Cooper test (Bandyopadhyay, 2015) [3].

3. Statistical Analysis

Data were analyzed using SPSS 20.0. Independent t-tests (or Mann-Whitney U tests for non-normal distributions) compared sexes. Effect sizes (Cohen's d) were calculated. Significance was set at $p < 0.05$.

Results

1. Baseline Fitness and Sex Comparisons

Table 1 presents the baseline physical fitness characteristics.

Statistically significant sex differences were found for handgrip strength, standing long jump, 30-second sit-ups, 30 m sprint, and 5-minute run (all $p < 0.001$). The effect sizes were very large for handgrip strength (Cohen's d = 4.31) and standing long jump (d = 4.65). In contrast, no significant difference was observed for agility (4×10 m shuttle run, $p = 0.563$, d = 0.07), indicating comparable levels of agility between male and female students.

Table 1: Baseline GPF results with sex comparisons and effect sizes

FC	F (n=369)	M (n=96)	MD	95% CI	t	p	d
1	28.75 ± 2.89	41.06 ± 2.71	12.31	[11.69, 12.93]	38.95	<0.001	4.31
2	156.90 ± 7.82	214.20 ± 15.80	57.30	[54.12, 60.48]	35.21	<0.001	4.65
3	15.44 ± 1.89	19.79 ± 0.89	4.35	[4.04, 4.66]	27.15	<0.001	2.50
4	13.22 ± 0.85	13.16 ± 0.86	-0.06	[-0.25, 0.14]	-0.58	0.563	0.07
5	6.12 ± 0.94	5.38 ± 0.26	-0.74	[-0.82, -0.66]	-17.54	<0.001	1.05
6	839.60 ± 25.40	972.52 ± 14.10	132.92	[127.76, 138.10]	49.69	<0.001	5.66

Note: FC = Fitness Component; F = Female; M = Male; MD = mean difference between males and females; d = Cohen's d effect size. Data are presented as mean ± SD. Cohen's d calculated using pooled SD; (1) Handgrip strength (kg); (2) Standing long jump (cm); (3) 30 s sit-ups (reps); (4) 4×10 m shuttle run (s); (5) 30 m sprint (s); (6) 5 min run (m).

Discussion

Our study provides baseline GPF values for Vietnamese students entering a basketball course. Compared to international references, our students' fitness levels were lower. For female students, mean 5 min run distance was 839.6 m, and standing long jump was 156.9 cm, which are lower than values reported for physically active young adult females (Baginski, 2022; Castro-Piñero *et al*., 2010) [2, 4], though these reference populations were more active than typical university students. For male students, mean 4×10 m shuttle run time was 13.16 s, and 30 m sprint was 5.38 s, which are slower than values reported for active young males (Little & Williams, 2005; Condello *et al*., 2013) [5, 9]. For example, based on Vietnam's MoET Decision No. 53/2008 [12] (Ministry of Education and Training [Vietnam], 2008) [12], 91.4% of female students failed the 5 min run standard, indicating a severe aerobic capacity deficit.

Our results are consistent with a broader pattern of declining youth fitness seen in many countries. A meta-analysis by Tomkinson *et al*. (2019) documented a 7.3% decline in cardiorespiratory fitness among children and adolescents from 19 countries over 33 years. Similar trends were observed in Chinese students between 1985 [7] and 2014 (Dong *et al*., 2019). The World Health Organization (2024) [19] reported that nearly 74% of adolescents in Southeast Asia do not meet physical activity guidelines.

Implications for Curriculum Design

Given these baseline values, we recommend that the Basketball 1 curriculum include a preconditioning phase before introducing complex skills. First, a preconditioning phase (weeks 1–4) should include aerobic interval training and plyometrics for female students, and change-of-direction drills for male students. Second, sex-specific learning outcomes are needed given the large effect sizes for strength and power. Female students may benefit from using lighter balls and resistance bands, while male students should focus on agility drills. Third, fitness development should be embedded within basketball contexts (e.g., fitness-skill hybrids, small-sided games with constraints). Fourth, fitness assessments in week 1 should be diagnostic (low stakes) and then test again at the end of the course to measure improvement.

Limitations

This study has several limitations. The cross-sectional design precludes causal inferences. The single-university setting limits generalizability. The male subsample (n=96) was smaller than the female subsample. Additionally, international reference values (e.g., little & Williams, 2005; Condello et al., 2013) [5, 9] were derived from trained athletes, not general students, which may overestimate fitness deficits. To our knowledge, no published international reference values exist for non-specialized university students in Southeast Asia, making direct comparisons challenging. Future studies should establish regional normative data for this population. No objective measure of physical activity or dietary habits was collected.

Conclusion

This study provides baseline GPF data for non-specialized university students before a basketball course at Saigon University. Female students showed mean 5 min run distances of 839.60 m and standing long jump distances of 156.90 cm. Male students showed mean 4×10 m shuttle run times of 13.16 s and 30 m sprint times of 5.38 s. Significant sex differences were observed for handgrip strength, standing long jump, sit-ups, 30 m sprint, and 5 min run ($p < 0.001$), but not for agility ($p = 0.563$). A substantial proportion of students failed to meet Vietnamese national fitness standards (MoET Decision No. 53/2008) [12], particularly in cardiorespiratory endurance among females. We suggest adding preconditioning exercises to the course, focusing on aerobic fitness for female students and agility/speed for male students.

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