

# Body Response of Class 2022 Students after 2 Semesters of Study in the Physical Education Study Program Faculty of Sports and Health Gorontalo State University

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## ABSTRACT

This study aims to examine the physiological responses of first-year Physical Education students at Universitas Negeri Gorontalo after completing two semesters of academic coursework. The research employed a descriptive quantitative approach with evaluative characteristics. Data were collected using the multistage 20-meter shuttle run test (bleep test), which estimates maximal oxygen uptake (VO<sub>2</sub>max) and cardiovascular fitness. A total of 74 students participated in the study, consisting of 63 male and 11 female students. The results revealed a significant increase in VO<sub>2</sub>max among male students, with the mean value rising from 31.06 to 33.97. Furthermore, individual variability increased, as indicated by a rise in variance from 21.83 to 34.81. In contrast, no significant differences were observed in the female cohort; their average VO<sub>2</sub>max values remained relatively stable (from 23.14 to 23.82), with variance decreasing slightly from 8.30 to 6.81. These findings suggest that male students experienced notable improvements in aerobic fitness after two semesters, likely due to the structured combination of theoretical and practical coursework. However, the lack of change among female students may reflect a need

for more targeted interventions. This study provides essential insights into how physical education curricula impact physiological development and offers implications for future sports science pedagogy.

**Keywords:** aerobic fitness, bleep test, physical education, physiological response, VO<sub>2</sub>max

## INTRODUCTION

Each individual is born with unique characteristics, including potential and talent in sports. However, such potential does not naturally develop without deliberate intervention and structured guidance. Educational institutions, especially those offering physical education programs, hold a vital responsibility in identifying, nurturing, and developing students' athletic abilities through both theoretical and practical learning experiences. At the higher education level, this role is further formalized through curriculum designs that integrate physical training and academic instruction in a balanced and systematic manner.

The Physical Education, Health, and Recreation Study Program (PJKR) at Universitas Negeri Gorontalo exemplifies this approach by implementing a bi-semester academic system. First-year

students in this program are required to complete 20 credit units per semester, consisting of 11 credits of theoretical courses and 9 credits of practical courses. While the credit load remains consistent between the odd and even semesters, the sports disciplines and practical activities offered vary from semester to semester. This structure aims to ensure comprehensive exposure to both theoretical knowledge and physical training, allowing students to gradually develop their competencies.

A student's physical response, particularly in practice-oriented subjects, is often seen as a reflection of their engagement and readiness in the learning process. The effectiveness of integrating theoretical instruction with field-based practice can be gauged through measurable physiological outcomes. Sitorus et al. (2020) described the human body as an intricate system capable of performing highly complex activities, many of which occur unconsciously. Furthermore, Shetty (2005) stressed the necessity for higher physical activity levels among athletes when compared to the general population. In a similar vein, Colberg et al. (2016) and Setiawan et al. (2021) highlighted that physical activity encompasses all movements that elevate energy expenditure and that maintaining an adequate level of physical fitness is crucial for effective task performance, particularly in athletic and sports-related activities.

Despite the established goals of physical education curricula, there remains a scarcity of empirical research investigating the extent to which structured coursework over two academic semesters influences students' physical capacities, especially regarding aerobic fitness as measured by maximal oxygen uptake ( $VO_2\text{max}$ ). This gap is even more evident when considering differences between male and female students, whose physiological responses may vary significantly. Additionally, the transitional phase from secondary to tertiary education marks a critical period in students' physical development, yet studies focusing on this aspect remain limited.

This study, therefore, aims to examine the physiological responses—specifically  $VO_2\text{max}$ —of the 2022 cohort of Physical Education students at Universitas Negeri Gorontalo after completing two semesters of study. The central hypothesis proposed is that there is a significant difference in the  $VO_2\text{max}$  of male and female students before and after undergoing the structured coursework provided by the program. By addressing this issue, the study seeks to contribute to the existing body of knowledge on the impact of higher education physical education programs on students' aerobic fitness and overall physiological development.

## **MATERIALS & METHODS**

### **Research Design**

This study employed a descriptive quantitative research design (Bloomfield & Fisher, 2019) to evaluate the physiological responses of first-year students enrolled in the Physical Education, Health, and Recreation program at Universitas Negeri Gorontalo. The study aimed to measure changes in aerobic capacity following two semesters of academic and practical coursework.

### **Participants**

The study involved all 2022 cohort students from the Department of Physical Education, totalling 74 individuals (63 males and 11 females). The population was selected through total sampling, considering that all participants met the inclusion criteria, namely active enrolment and full participation in both classroom and field-based courses.

### **Research Instrument**

Data were collected using the multistage 20-meter shuttle run test (commonly known as the bleep test). This test is widely recognized for its reliability and validity in estimating maximal oxygen uptake ( $VO_2\text{max}$ ) and assessing cardiovascular endurance (Kavcic et al., 2012). The test requires participants to run continuously

between two lines placed 20 meters apart, synchronized with increasing beep intervals until exhaustion.

### Research Procedure

The testing was conducted on the university's physical education tennis court. Prior to the intervention (i.e., commencement of the two-semester coursework), a baseline measurement of VO<sub>2</sub>max was recorded for each participant. Following two semesters, the same test was administered again to capture any physiological changes. Each test was supervised by faculty members to ensure standard procedures were followed.

### Data Analysis

Data were analyzed using descriptive statistics to determine mean scores and variances of VO<sub>2</sub>max before and after the intervention. Additionally, inferential statistical analyses were performed using paired t-tests and F-tests to identify significant differences in group means and variances, respectively, between pre- and post-test results (Cooksey, 2020). Comparisons were also conducted by gender to explore differential responses. All statistical procedures were executed using SPSS version 25.0, with significance levels set at  $p < 0.05$  and  $p < 0.01$ .

## RESULT & DISCUSSION

### Aerobic Capacity Improvement among Male Students

The analysis of male students' physiological responses revealed a significant improvement in aerobic capacity after completing two academic semesters in the Physical Education, Health, and Recreation program. Out of 63 male participants, the average VO<sub>2</sub>max score prior to the intervention was 31.06 with a variance of 21.83. After two semesters of structured coursework—which integrated both theoretical instruction and practical physical activities—the average VO<sub>2</sub>max increased to 33.97, accompanied by an increased variance of 34.81. The paired sample t-test confirmed that this increase was statistically significant ( $p = 0.0027$ ,  $\alpha = 0.01$ ), highlighting a positive adaptation in aerobic fitness levels following the curriculum.

Additionally, the F-test showed a significant change in variance ( $p = 0.0343$ ,  $\alpha = 0.05$ ), suggesting that while the overall aerobic capacity of male students improved, the degree of improvement varied among individuals. This variation may reflect differences in baseline fitness levels, personal motivation, participation intensity, or physiological adaptability to the training stimuli. Such findings emphasize the role of individual factors in determining physical training outcomes, even within a standardized educational program.

Table 1. Comparison of VO<sub>2</sub>max Scores among Male Students (n = 63)

Measurement	Mean VO <sub>2</sub> max	Variance	p-value (t-test)	p-value (F-test)
Pre-test	31.06	21.83		
Post-test	33.97	34.81	0.0027*	0.0343**

\*Significant at  $\alpha = 0.01$  (t-test); \*\*Significant at  $\alpha = 0.05$  (F-test)

These results confirm that the curriculum has positively impacted male students' aerobic fitness, although the degree of improvement varied among individuals.

### Stability of Aerobic Capacity among Female Students

In contrast, the results for female students displayed a markedly different trend. Among the 11 female participants, the mean

VO<sub>2</sub>max before the intervention stood at 23.14 with a variance of 8.30. Post-intervention testing recorded a slight increase in the mean VO<sub>2</sub>max to 23.82, while the variance decreased marginally to 6.81. However, statistical analysis revealed no significant differences in either the mean or variance. This outcome indicates that the two-semester curriculum, as designed and implemented, did not induce measurable

improvements in aerobic capacity among female students.

**Table 2. Comparison of VO<sub>2</sub>max Scores among Female Students (n = 11)**

Measurement	Mean VO <sub>2</sub> max	Variance	p-value (t-test)	p-value (F-test)
Pre-test	23.14	8.30		
Post-test	23.82	6.81	> 0.05 (ns)	> 0.05 (ns)

ns = not significant

These findings suggest that the program's content or training load may have been insufficiently challenging or relevant to elicit meaningful physiological adaptations in female students. Possible contributing factors could include differences in exercise responsiveness between genders, variations in initial fitness levels, or the nature of the activities offered during the program. Previous research (Boullosa et al., 2020; Gronwald et al., 2020) have indicated that individualized or gender-specific training regimens often yield better physiological outcomes, which may explain the lack of significant improvement in this subgroup.

### **Implications for Physical Education Curriculum Development**

The contrasting results between male and female students underline the importance of revisiting and refining the physical education curriculum to ensure its effectiveness across diverse student populations. While the significant improvement observed in male students demonstrates the curriculum's potential to enhance aerobic fitness, the absence of similar gains among female students raises concerns about the program's inclusivity and adaptability.

These outcomes highlight the need for continuous monitoring and evidence-based adjustments within the curriculum. Incorporating differentiated training loads, gender-sensitive program designs, and personalized feedback mechanisms could enhance the program's impact on students' physical development. Tailored interventions may not only optimize fitness gains but also foster equitable educational experiences in sports and physical education settings.

Ultimately, this study underscores the critical role of structured academic programs in shaping students' physiological capacities while also calling attention to the necessity of curriculum flexibility to accommodate individual and gender-specific needs. Future research should explore more targeted approaches and longitudinal monitoring to maximize the effectiveness of physical education in higher education contexts.

### **CONCLUSION**

This study revealed significant physiological adaptations among male students after completing two semesters in the Physical Education, Health, and Recreation program at Universitas Negeri Gorontalo. The increase in VO<sub>2</sub>max indicates improved aerobic capacity, likely driven by regular engagement in practical coursework. In contrast, female students showed no significant change in VO<sub>2</sub>max, suggesting the need for more targeted training approaches to stimulate similar physiological responses.

These findings emphasize the importance of evaluating training outcomes within academic programs and suggest that gender-specific adjustments may enhance curricular effectiveness. Continuous monitoring of physical performance indicators such as VO<sub>2</sub>max can serve as a valuable tool in aligning educational goals with students' physical development.

### **Declaration by Authors**

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