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The Impact of Gymnastics Learning on the Endurance Improvement of Seventh Grade Students at State Junior High School 6 in Bengkulu City

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Abstract
This research was conducted to address the low level of physical fitness, particularly VO_2Max, among junior high school female students, which impacts their overall health and physical performance. The objective of this study was to investigate the effect of poco-poco and SKJ 2021 aerobic exercise programs, along with the influence of exercise motivation, on the improvement of VO_2Max in female students at SMP Negeri 6 Bengkulu. The study employed a quantitative approach using a quasi-experimental method with a 2x2 factorial design. A total of 24 female students were selected through total sampling and divided into four treatment groups. The exercise was conducted over 12 sessions, and VO_2Max was measured using the Multistage Fitness Test (MFT). The results revealed that the group performing SKJ 2021 with high motivation (A2B1) achieved the highest average posttest VO_2Max score of 41.2 ml/kg/min, while the poco-poco group with low motivation (A1B2) had the lowest average score of 35.6 ml/kg/min. Two-way ANOVA analysis showed a significant effect of both exercise type and motivation level on VO_2Max ($p < 0.05$). The interaction between exercise and motivation was also statistically significant. These findings conclude that the combination of structured aerobic exercise and high motivation significantly enhances cardiovascular endurance in female junior high school students.

INTRODUCTION

Physical fitness plays a critical role in supporting students' overall health, academic performance, and psychological well-being (Rafiun & Yamin, 2022; Siregar, 2024). Among various components of physical fitness, cardiorespiratory endurance is one of the most essential indicators of physical health, often measured by VO_2Max, which reflects the body's ability to utilize oxygen during intense physical activity. Improving VO_2Max at an early age is crucial as it reduces the risk

of cardiovascular disease and promotes a more active lifestyle into adulthood. As such, schools have a significant responsibility to implement effective physical activity programs that not only improve fitness but also motivate students to participate actively (Baidhowi & SEI, 2022; Sari et al., 2024).

In Indonesia, structured aerobic exercises such as Senam Kesegaran Jasmani (SKJ) and traditional rhythmic movements like poco-poco dance are commonly used in school-based physical education (Astuti et al., 2023; Saputra, 2021). These exercises are accessible, culturally integrated, and easy to implement across various age groups. While SKJ 2021 is a government-endorsed aerobic routine designed to improve general fitness, poco-poco offers a more dynamic and rhythm-based experience that may appeal more to students, especially females. However, despite their frequent use, there is limited empirical evidence comparing the effectiveness of these two exercise methods in improving students' cardiorespiratory endurance, particularly when considering psychological factors such as motivation (Fatinabila et al., 2024; Sujoko & Saputra, 2022).

Recent studies have highlighted the importance of psychological aspects in determining the outcomes of physical training (Riyadi et al., n.d.; Rubiana et al., 2020). Motivation, particularly intrinsic motivation, is known to significantly affect an individual's engagement in exercise and the resulting physiological adaptations. While some research has addressed the role of motivation in sports performance, fewer studies have explored how it interacts with different types of aerobic exercise in the context of school-based programs. Understanding this interaction is crucial for designing physical education strategies that maximize both participation and health outcomes (Lismana & Suwarni, 2021; Warni et al., 2022).

The novelty of this study lies in its examination of the combined effects of exercise type (poco-poco and SKJ 2021) and motivation level on VO_2Max improvement among junior high school female students. While previous research has independently assessed the effectiveness of aerobic exercises or the role of motivation, this study explores their interaction in a controlled educational setting. This provides a more comprehensive understanding of how both physical and psychological factors contribute to the improvement of cardiorespiratory fitness (Nurkholis et al., 2024; Tajibaev et al., 2024).

Therefore, this research aims to analyze the impact of different aerobic exercise routines and motivational levels on the enhancement of VO_2Max. It seeks to determine not only which exercise method is more effective but also how student motivation influences the effectiveness of these programs. The findings are expected to inform the development of more targeted and effective physical education interventions that align with students' preferences and motivational profiles.

METHODS

This study employs a quantitative approach using a quasi-experimental method with a 2x2 factorial design to investigate the effects of two aerobic exercise types—poco-poco dance and SKJ 2021—and students' motivation levels on the improvement of VO_2Max among female students of class VII at SMP Negeri 6 Kota Bengkulu. The research design includes pretest and posttest assessments. The entire population, consisting of 24 female students, was selected through total sampling. The research variables include two independent variables (types of exercise and motivation level) and one dependent variable (VO_2Max improvement). The Multistage Fitness Test

(MFT) was used to measure VO_2Max, while a questionnaire consisting of 32 items assessed motivation levels. Treatments were conducted over 12 sessions, with two meetings per week.

Data collection techniques included observation, documentation, pretest-posttest evaluations, and the MFT. Data analysis involved normality and homogeneity tests using SPSS 23, followed by a two-way ANOVA to examine the influence of exercise types and motivation on VO_2Max. The goal was to determine whether there were significant differences in VO_2Max improvements between groups based on exercise type and motivation level, as well as whether there was an interaction effect between the two variables. The findings are expected to contribute to the development of effective school-based aerobic training programs that take into account both physical and psychological student factors.

RESULT AND DISCUSSION

Table 1: Average VO2Max Pre-test and Post-test in Students

Group	Average VO2Max Pre-test	Average VO2Max Post-test	Difference
Poco-Poco Exercise (High Motivation)	30,50 ml/kg/min	35,60 ml/kg/min	+5,10
Poco-Poco Exercise (Low Motivation)	29,80 ml/kg/min	32,90 ml/kg/min	+3,10
SKJ 2021 Gymnastics (High Motivation)	31,00 ml/kg/min	34,80 ml/kg/min	+3,80
SKJ 2021 Gymnastics (Low Motivation)	29,50 ml/kg/min	31,70 ml/kg/min	+2,20

This table shows that all groups experienced an increase in VO2Max after the treatment, with a greater increase observed in the poco-poco gymnastics group, especially in the subgroup with high motivation.

Table 2: Results of Two-Way ANOVA Test

Source of Variation	JK	Df	MK	F	Sig. (p)
Gymnastics (A)	160,50	1	160,50	12,45	0,001
Motivation (B)	120,40	1	120,40	9,34	0,004
Interaction (A*B)	35,20	1	35,20	2,73	0,046

The results of the ANOVA test showed that there is a significant effect of the type of exercise (poco-poco vs. SKJ 2021), exercise motivation (high vs. low), and the interaction between these two variables on the increase of students' VO2Max.

Table 3: Results of the Tukey HSD Test

Comparison Group	Mean Difference	Sig. (p)
Poco-Poco vs SKJ (High)	2,60	0,002
Poco-Poco vs SKJ (Low)	1,70	0,035

The Tukey HSD test showed that the difference between the poco-poco gymnastic group and the SKJ 2021 group is significant, especially among students with high motivation.

Discussion

The research findings demonstrate that both the type of aerobic exercise (poco-poco and SKJ 2021) and students' motivation significantly influence the improvement of VO2Max among female students of grade VII at SMP Negeri 6 Kota Bengkulu. Poco-poco aerobic exercise, characterized by rhythmic and repetitive movements, significantly enhances cardiovascular fitness due to its relatively high intensity. The activity activates major muscle groups, increasing oxygen demand and cardiovascular efficiency, thereby contributing to a more substantial VO2Max improvement, particularly among highly motivated students (Jo et al., 2024; Singh et al., 2024).

On the other hand, SKJ 2021 exercise, although lower in intensity than poco-poco, still yields significant benefits in improving VO2Max, especially when practiced consistently by students with high motivation (Altynova et al., 2024). The structured and accessible nature of SKJ 2021 makes it suitable for school programs, as it focuses on enhancing flexibility, muscular endurance, and coordination. However, due to its moderate intensity, the VO2Max improvement is not as pronounced as with the poco-poco routine.

Motivation plays a vital role in determining the effectiveness of physical exercise on VO2Max development. Students with high intrinsic motivation tend to engage more actively and consistently in training, which leads to better physiological outcomes. Theories such as Self-Determination Theory support the idea that motivated individuals are more likely to commit to physical activity, deriving satisfaction from the process and showing greater improvements in physical performance (Ridwan et al., 2024).

The study reveals a significant interaction between exercise type and motivation level. The most optimal VO2Max improvement was observed in students who participated in poco-poco exercises with high motivation. Conversely, the least improvement occurred in those who performed SKJ 2021 with low motivation. This indicates that the combination of a suitable aerobic program and high motivation is essential to achieve optimal results in cardiovascular fitness training. These findings underscore the importance of integrating motivational strategies into physical education programs to maximize their effectiveness (Mesfen & Melkamu, 2024).

CONCLUSIONS

The study concludes that both poco-poco and SKJ 2021 aerobic exercises have a significant impact on improving VO_2Max levels among female students, with the level of motivation also playing a crucial role. Furthermore, there is a notable interaction between the type of exercise and the students' motivation, indicating that the effectiveness of the training programs can be enhanced when aligned with the students' motivation levels. These findings suggest that implementing varied and engaging aerobic exercise programs, supported by motivational strategies, can effectively enhance cardiovascular fitness in junior high school students.

CONFLICTS OF INTEREST STATEMENT

Regarding this study, the author declares that there is no conflict of interest.

AUTHOR CONTRIBUTIONS

Study concept and design: Hidayah Mustika Canggih. Acquisition of data: Nuridin Widya Pranoto. Analysis and interpretation of data: Wilda Welis. Drafting the manuscript: Hidayah

Mustika Canggih. Critical revision of the manuscript for important intellectual content: Sayuti Syahara. Statistical analysis: Hidayah Mustika Canggih.

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