Journal Sport Area
http://journal.uir.ac.id/index.php/JSP
Vol. 10. No. 1. April, (2025)

Improving lecturer fitness through physical activity: A study with rhythmic gymnastics and regular walking

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Received 12 October 2024; Accepted 13 January 2025; Published 16 April 2025
Ed 2025; *10*(1): 77-85

ABSTRACT

Background: Maintaining excellent physical fitness not only enhances mental well-being but also fosters teachers' ingenuity and inventiveness in devising effective teaching strategies. A fit body will be able to increase concentration, which means a teacher can deliver learning material better and achieve goals. Consequently, pupils become more engaged and comprehend the instructional material more easily. **Research Objectives**: This study aims to determine the effect of rhythmic gymnastics and walking more than 7,500 steps per day for 8 weeks on fitness and BMI. **Methods**: The employed research method was quantitative research using a causal-associative approach. This study utilised 43 participants who met the following criteria: they were between the ages of 35 and 55, actively engaged as lecturers in the teacher professional education program (PPG) at Universitas Negeri Surabaya, and willing to participate in the study for a duration of 60 days, during which they would receive the given intervention. The intervention given was in the form of Indonesian teacher gymnastics with a composition of 2 minutes of warm-up, 11 minutes of core, and 2 minutes of cool-down. In addition to gymnastics, the intervention involved walking at least 7,500–8,000 steps per day, every day, for a duration of 8 weeks (60 days). For sample step control, samples are required to send a report of their daily steps that have been recorded through the Pedometer-SStep Counter App. Data analysis used paired t-tests and SPSS 23 software to assess the intervention's impact on body mass index and fitness. **Findings and Results**: The results showed that combined rhythmic gymnastics training (Indonesian Teachers Gymnastics) and walking more than 7,500 for 8 weeks can increase VO_2 max (pre 28.68 11.37; post 32.08 13.26; p = 0.000), but did not significantly affect changes in BMI (pre 25.51 4.88; post 25.43 4.02; p = 0.760). **Conclusion**: Rhythmic gymnastics training and daily 7,500 steps of walking for 8 weeks can improve cardiorespiratory fitness in middle-aged professionals but may not alter BMI. This simple, accessible workplace health program can enhance cardiovascular fitness.

Keywords: Rhythmic gymnastics; walking exercise; VO_2 max; BMI

https://doi.org/10.25299/sportarea.2025.vol10(1).19429

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How to Cite: Kafrawi, F. R., Purnomo, M., Ashadi, K., García-Jiménez, J. V., & Rusdiawan, A. (2025). Improving Lecturer Fitness Through Physical Activity: A Study with Rhythmic Gymnastics and Regular Walking. *Journal Sport Area*, *10*(1), 77-85. https://doi.org/10.25299/sportarea.2025.vol10(1).19429

Authors' Contribution: a – Study Design; b – Data Collection; c – Statistical Analysis; d – Manuscript Preparation; e – Funds Collection

INTRODUCTION

According to Government Regulation Number 19 of 2017 Article 52, professional teachers are required to have a minimum of 24 hours and a maximum of 40 hours of face-to-face teaching every week (Widiarto, 2020). Teachers must maintain a state of excellent health and physical fitness in order to effectively communicate the learning material. By maintaining a state of robust health and physical fitness, teachers can avoid fatigue and illness and enhance their immune systems (Torar & Wahono, 2016). This, in turn, enables them to effectively meet the demands of their job as qualified teachers and increase their productivity (Darling-Hammond et al., 2024). Maintaining excellent physical fitness not only enhances mental well-being but also fosters teachers' ingenuity and inventiveness in devising effective teaching strategies (Daw-as & Pelila, 2024). A fit body will be able to increase concentration (Handayani et al., 2024), which means a teacher can deliver learning material better and achieve goals. Consequently, pupils become more engaged and comprehend the instructional material more easily.

Regular physical activity, such as rhythmic gymnastics and walking, has been shown to have numerous health benefits (Nystoriak & Bhatnagar, 2018; Herbert et al., 2020). Consistent physical activity is a preventive measure and cure for non-communicable diseases (NCDs), improving mental health and quality of life. Conversely, inactivity and sedentary lifestyles have negative impacts on individuals, families, and society, particularly the obesity epidemic (Gualdi-Russo & Zaccagni, 2021). Physical activity, including walking, cycling, occupational tasks, household chores, sports, and exercise, is crucial for maintaining health and well-being (Dhuli et al., 2022). Regular participation can reduce mortality rates by 31% and contribute to overall health and well-being, as suggested by global health authorities (Wiriawan et al., 2024).

Aerobic exercise, in particular, has been associated with improvements in various aspects of physical and mental well-being, including cardiovascular function, weight management, and cognitive performance. Mounting evidence suggests that aerobic exercise can have a positive impact on academic performance and cognitive functions (Guadagni et al., 2020; Kandola et al., 2016). Studies have found that even a single bout of moderate-intensity aerobic exercise, such as walking, can lead to acute improvements in academic achievement scores among pre-adolescent youth (Muntaner-Mas et al., 2024). Additionally, regular rhythmic gymnastics has been linked to increased cardiorespiratory fitness, which has been shown to mediate improvements in academic performance and the allocation of neural resources underlying working memory tasks (Nystoriak & Bhatnagar, 2018; Bull et al., 2020).

Numerous studies have highlighted the importance of regular physical activity in maintaining a healthy weight and reducing the risk of chronic diseases (Dhuli et al., 2022; Posadzki et al., 2020). Physical inactivity has been linked to a range of negative health outcomes, including increased risk of cardiovascular disease, type 2 diabetes, and certain types of cancer (Wilmot et al., 2012). Conversely, engaging in regular exercise has been shown to have numerous health benefits, such as improved cardiovascular function, metabolic health, and reduced arterial stiffness (Kresnajati et al., 2022; Myers et al., 2019). One form of exercise that has gained attention in recent years is rhythmic gymnastics, a sport that combines elements of dance, acrobatics, and the use of various hand-held apparatuses. Rhythmic gymnastics has been found to have positive effects on physical fitness, body composition, and overall health (Skopal et al., 2020). Additionally, walking is a low-impact exercise that has been widely recommended for its numerous health benefits, including weight management, cardiovascular health, and improved mental well-being (Omura et al., 2019). However, another study found that an 8 week walking intervention, conducted three times a week (Monday, Wednesday, and Friday), with an initial target of 6,000 steps per day, increasing to 7,000 steps after two weeks, and continuing up to 8,000 steps, had no effect on body fat percentage or cardiovascular endurance (Suksong et al., 2024).

The relationship between physical activity, fitness, and academic performance is complex and not fully understood. While some studies have reported a positive association between aerobic fitness and academic achievement, others have found that the effects may be influenced by factors such as obesity and ethnicity (Álvarez-Bueno et al., 2020). Nevertheless, there is growing recognition that optimising student health and physical fitness should be a priority for schools, as these factors may have important implications for learning and cognition (Álvarez-Bueno et al., 2020).

Given the potential benefits of regular physical activity, it is important to investigate the effects of aerobic exercise, like rhythmic gymnastics and walking, on the Body Mass Index (BMI) and fitness of specific populations, such as university lecturers. Lecturers play a crucial role in shaping the academic and professional development of students, and their own health and well-being can have a significant impact on their ability to effectively fulfil their responsibilities. This study aims to investigate the effect of an 8 week aerobic exercise and walking programme on the body mass index and fitness of lecturers at the Teacher Professional Education Programme (PPG) of Universitas Negeri Surabaya. This research is important to understand how simple and affordable exercise programs, such as rhythmic gymnastics and walking, can improve cardiovascular fitness, especially in middle-aged lecturers who often have limited time. These findings have the potential to encourage educational institutions and companies to implement practical and effective health programmes to improve productivity and the physical and mental well-being of workers, thus positively impacting work quality and long-term health.

METHOD

This study employs an experimental design and a quantitative methodology. This research focuses on lecturers at the Universitas Negeri Surabaya's Teacher Professional Education program (PPG). This study utilised 43 participants who met the following criteria: they were between the ages of 35 and 55, were currently employed as lecturers at the teacher professional education programme (PPG) at Universitas Negeri Surabaya, and were willing to participate in the study for a duration of 8 weeks (60 days), during which they would receive the given intervention.

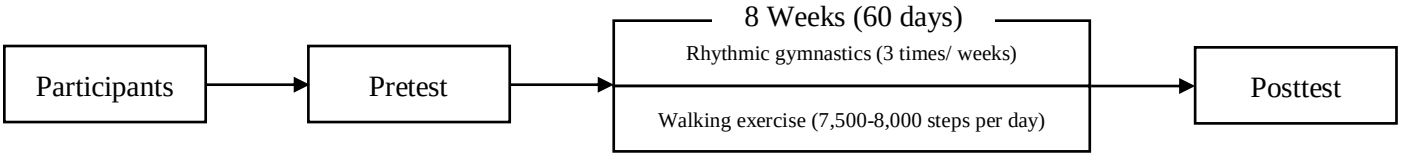

Figure 1. Research Design

This research instrument uses tests to determine fitness, including the 1.6 km rockport test (Seneli et al., 2013), and anthropometry tests (height and weight) to determine BMI (Taufikkurrachman et al., 2021). The test was conducted twice, namely before the intervention (pretest) and after the intervention (posttest).The intervention given was in the form of Indonesian teacher gymnastics, with a composition of 2 minutes of warm-up, 11 minutes of core, and 2 minutes of cool-down. The music's tempo was l during warm-up and cool-down, medium tempo at cores 1, 2, and 4, and high tempo at core 3. The rhythmic gymnastics utilised can be found on YouTube under the link https://www.youtube.com/watch?v=oc5tjwFQ1dU. This gymnastics has received recognition from the Indonesian Record Museum (MURI) as Indonesian teacher gymnastics.

The gymnastics session took place three times a week, specifically on Monday, Wednesday, and Friday at 07:00 am. In addition to gymnastics, the intervention involved walking at least 7,500–8,000 steps per day every day for 8 weeks (60 days). For sample step control, samples were required to send a report of their daily steps that had been recorded through the Pedometer-Step Counter App. Before the intervention, the sample underwent a pre-test where they measured their body weight and height for body mass index data, conducted a Rockport test (1.6 km), and then repeated the same test for the posttest. The results of the Rockport test were then converted with the Rockport test calculator, and VO_2 max data was obtained along with its fitness category. In this study, data analysis used paired t-test analysis to determine whether the intervention's results had a significant effect on body mass index and fitness. The research analysis was assisted by SPSS 23 software and Microsoft Office Excel 2016.

RESULTS AND DISCUSSION

Result

The following data represent the sample characteristics for this study:

Table 1. Characteristics of Research Samples

Characteristic	*F*	Mean±SD
Gender	43	
• Men	25	
• Women	18	
Age (year)	43	50.72±4.70
• < 40 years	4	
• 40-47 years	32	
• 48-55 years	7	
Height (cm)	43	163±8.82
Weight (Kg)	43	68.07±14.36
Teaching experience (years)	43	21.37±5.65

Table 1 shows that the research sample is predominantly male, with a percentage of 58.14%. The majority age is also represented by samples aged 40–47 years, with a percentage of 74.42% and an average teaching experience of 21.37 years. Figure 2 presents the mean and standard deviation of the VO_2 max and BMI variables.

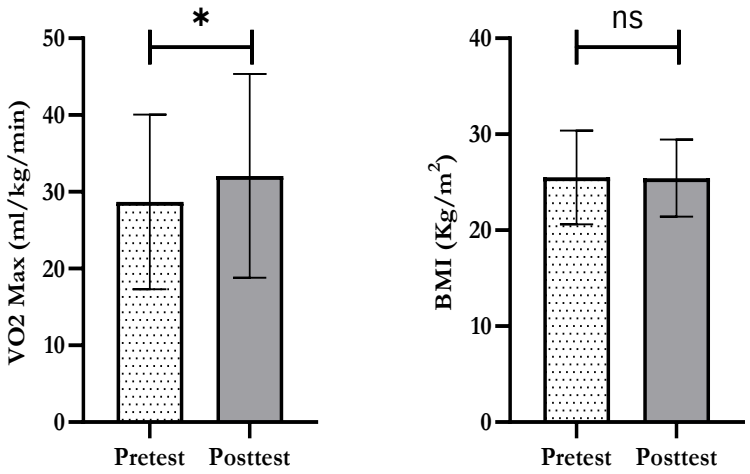

Figure 2. The Changes in VO_2 Max and BMI; (*) Significant Difference ($p \leq 0.05$); (ns) No Significant Difference

The results of the normality test showed that the data was normally distributed, with a VO_2 max value of 0.080 and a BMI value > 0.05. Furthermore, a paired t-test was conducted on the VO_2 max and BMI variables with the following results:

Tabel 2. Differences in VO_2 Max and BMI after 8 Weeks of Rhythmic Gymnastics and Walking Exercise

Variable	Mean ± SD		*p*(sig.)
	Pre	Post	
VO_2 max	28.68 ± 11.37	32.08 ± 13.26	0.000*
BMI	25.51 ± 4.88	25.43 ± 4.02	0.760

* significantly different from the value of p < 0.05

Table 2 shows that combined rhythmic gymnastics (Indonesian teacher gymnastics) and walking more than 7,500 for 8 weeks can increase VO_2 max but do not have a significant effect on changes in BMI.

This research shows that regular exercise for 8 weeks in the form of rhythmic gymnastics and walking 7,500 steps can increase fitness, as indicated by an increase in VO_2 max based on the Rockport test. VO_2 max is the most valid measurement of the functional capacity of a person's fitness system (Buttar et al., 2019). Meanwhile, the effects of exercise on fitness include increasing heart size, decreasing resting heart rate, increasing cardiac output volume, increasing blood volume and hemoglobin, increasing capillary intensity, and increasing muscle hypertrophy (Lavie et al., 2015; Nystoriak & Bhatnagar, 2018).

Rhythmic gymnastics, a captivating and demanding discipline within the realm of gymnastics, has garnered significant attention in the realm of sports science due to its potential to elicit various physiological adaptations. One such adaptation of particular interest is the impact of rhythmic gymnastics training on an individual's maximal oxygen uptake (VO_2 max) and body mass index (BMI). Recent studies have provided intriguing insights into the relationship between rhythmic gymnastics training and these key physiological markers. Specifically, research has suggested that a rhythmic gymnastics training regimen may lead to a notable increase in an individual's VO_2max, a crucial indicator of aerobic fitness (Crowley et al., 2022). This finding aligns with the well-established principle that high-intensity aerobic training, such as that encountered in rhythmic gymnastics, can drive improvements in maximal oxygen uptake (Ito et al., 2024).

However, the impact of rhythmic gymnastics training on body mass index (BMI) appears to be more nuanced. While some studies have reported modest decreases in BMI following rhythmic gymnastics training (Purenović-Ivanović et al., 2019), others have found no significant changes in this anthropometric measure (Campos-Pérez et al., 2022). This suggests that the effects of rhythmic gymnastics training on BMI may be more variable and dependent on individual factors, such as pre-existing body composition, training intensity, and nutritional intake.

Walking is a widely recognised form of physical activity that offers numerous health benefits, including improved cardiorespiratory fitness and weight management (Ungvari et al., 2023). Research has shown that regular walking can significantly improve VO_2 max (Gim & Choi, 2016). A key mechanism behind this is that exercise, including walking, increases insulin sensitivity and decreases insulin resistance, enhancing overall metabolic function (Salvitti, 2018). Additionally, regular physical activity, such as walking, has been linked to reduced risk of chronic diseases, including cardiovascular disease, type 2 diabetes, and certain types of cancer (Boutcher, 2016; Gim & Choi, 2016).

While walking has been demonstrated to improve cardiorespiratory fitness, its impact on body mass index (BMI) is more complex. Several studies have found that a walking program of 7,500 steps per day for 2 months can lead to significant increases in VO_2 max but does not necessarily result in improvements in BMI (Mohan et al., 2020). This suggests that while walking can improve overall fitness, it may not be sufficient on its own to drive significant changes in body composition.

One potential explanation is that the energy expenditure from walking 7,500 steps per day, while beneficial for cardiovascular health, may not be substantial enough to create a caloric deficit necessary for weight loss and BMI reduction. Other factors, such as diet and overall physical activity levels, likely play a more significant role in influencing BMI (Boutcher, 2016). Regarding cardiorespiratory fitness, the literature suggests that a combination of rhythmic gymnastics training and achieving a daily step count of at least 7,500 steps can lead to improvements in VO_2 max, a key indicator of cardiorespiratory fitness (Kaminsky et al., 2019). This is particularly relevant, as regular physical activity, including both structured exercise and incidental movement throughout the day, has been shown to have profound and robust benefits for individuals of all ages, including children and adolescents (Neto et al., 2014; Tudor-Locke et al., 2011).

However, the research also indicates that these interventions may not necessarily result in changes to Body Mass Index (BMI) (Tudor-Locke et al., 2011). While increasing physical activity levels can contribute to overall health and well-being, factors such as diet, genetics, and individual metabolic differences can also play a significant role in determining body composition (Tudor-Locke et al., 2011).

Ultimately, the existing body of research indicates that rhythmic gymnastics training and walking can effectively enhance an individual's VO_2 max, a crucial metric of aerobic fitness, but may not necessarily lead to significant changes in BMI. These findings underscore the complex interplay between physical activity,

body composition, and physiological adaptations, highlighting the need for a holistic approach to understanding the impacts of rhythmic gymnastics and walking training on human health and performance.

CONCLUSION

Rhythmic gymnastics training and walking a minimum of 7,500 steps per day for 8 weeks can lead to improvements in VO_2 max, a measure of cardiorespiratory fitness, but may not result in changes to BMI. This study recommends that rhythmic gymnastics training be integrated into a regular physical activity routine with a step count of at least 7,500 steps. This level of incidental movement throughout the day can complement the benefits of structured exercise and contribute to improved cardiorespiratory fitness. This study has several limitations, one of which is that the 8 week intervention duration may not be sufficient to see significant changes in BMI, as changes in body composition often take longer to occur. In addition, additional variables, such as diet, daily physical activity outside the study parameters, and individual metabolic differences, were not controlled, which could have influenced the BMI results. This study also only used VO_2 max and BMI as indicators of fitness and health; the use of additional metrics, such as body fat percentage, muscle mass, or lipid profile, may provide a more comprehensive picture. For future studies, it is recommended that the intervention duration be extended beyond 8 weeks to identify whether a longer period can produce significant changes in BMI and fitness. Furthermore, it is recommended that involving a more diverse population in terms of age, fitness level, and occupation can also provide insight into the effectiveness of rhythmic gymnastics and walking training in different demographic groups. In addition, monitoring diet can help isolate the effect of physical activity on BMI and provide a clearer picture of the impact of exercise. Finally, future studies can consider other health measures, such as changes in body composition, disorders, mental well-being, and metabolic health indicators, to gain a more comprehensive understanding of the benefits of exercise.

ACKNOWLEDGEMENTS

We would like to thank the lecturers at PPG Universitas Negeri Surabaya who have participated in this research. We would also like to thank the PPG Universitas Negeri Surabaya fitness team, who assisted in the analysis and data collection for this study.

CONFLICT OF INTEREST

The authors state no conflict of interest.

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