



## The Effect of the Pesantren Educational Environment on the Cardiovascular Fitness Outcomes of Seventh-Grade Students at MTs Manba'ul Hikam

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### ABSTRACT

The pesantren environment has distinctive characteristics, particularly a dense schedule of academic, religious, and boarding activities, which may influence students' cardiovascular fitness. This study aimed to analyze the effect of the pesantren context on the cardiovascular fitness of seventh-grade students at MTs Manbaul Hikam. A descriptive quantitative approach with mixed methods was employed. Primary data were obtained through cardiovascular fitness measurements using the Progressive Aerobic Cardiovascular Endurance Run (PACER) Test, while supporting data were collected through semi-structured interviews. The research involved 174 seventh-grade students from five classes. Interviews were conducted with a Physical Education teacher, a pesantren supervisor, and three students to explore daily activity patterns. The results showed that students' overall cardiovascular fitness was in the low category. Although Physical Education lessons and sports extracurricular activities were provided, students' participation levels and physical activity intensity were uneven. Interview findings revealed that the dense daily schedule and limited rest time were significant factors affecting students' fitness. In conclusion, the pesantren context influences students' cardiovascular fitness through the regulation of daily activities and lifestyle patterns, indicating the need for better balance between academic, religious, and physical activities.

## 1. Introduction

The current development of the education sector requires educational institutions not only to produce academically excellent graduates but also individuals with optimal physical health (World Health Organization, 2022). Madrasah Tsanawiyah Manbaul Hikam (MTs Mahika), established in 1999, is one of the educational institutions under the Manba'ul Hikam Islamic Boarding School Foundation that

seeks to integrate religious and general education. MTs Mahika is committed to preparing a generation with strong character, global competitiveness, and holistic health, as reflected in its vision of fostering students who are religious, broad-minded, and globally competitive (Ministry of Education, Culture, Research, and Technology, 2022).

The curriculum implemented at MTs Mahika is the Merdeka Curriculum, which emphasizes integrated learning, skill development, and extracurricular activities as integral components of intensive and well-structured learning (Kemendikbudristek, 2022). In practice, the available extracurricular activities, including sports, serve as an important platform for students to develop their physical abilities and fitness (Bailey et al., 2013). However, students' lives within the Islamic boarding school environment have distinctive characteristics that influence their patterns of physical activity. In addition to participating in formal education, boarding school students are also involved in various pesantren activities such as religious study sessions, diniyah activities, takror, and other routine activities that are carried out continuously throughout the day (Zuhri & Hidayat, 2021). This dense daily routine has the potential to affect the time and opportunities students have to engage in active movement outside Physical Education (PJOK) classes and other structured activities. Physical Education guidelines in schools as well as extracurricular activities organized in pesantren recognize that regular physical activity plays a vital role in the development of physical fitness, including cardiovascular fitness (Corbin et al., 2014). Research indicates that physical activity has a positive correlation with the physical fitness of adolescent students (aged 12–15 years), where students with higher levels of physical activity tend to have better physical fitness (Zahron & Fadhli, 2025).

Cardiovascular fitness (cardiorespiratory fitness) is one of the main components of physical fitness related to the ability of the heart and lungs to supply oxygen during moderate- to high-intensity physical activity. This type of fitness functions as an indicator of health and physical readiness, enabling students to carry out various daily activities without experiencing rapid fatigue (American College of Sports Medicine, 2021). Other studies have also shown that high levels of daily physical activity are strongly associated with students' physical fitness, and the higher the level of physical activity performed by students, the better their fitness level (Groffik et al., 2020).

In the context of the pesantren environment, the organization of study time, activity schedules, and opportunities for sports are not always equivalent to those in general schools. Barriers such as limited sports facilities, dense schedules, and the complex structure of pesantren activities can reduce students' opportunities to engage in sufficient physical activity to improve their cardiovascular fitness. Findings from studies conducted in junior and senior high schools indicate a relationship between daily physical activity and physical fitness, emphasizing that without adequate environmental support, students' physical fitness tends to be lower (Rijal & Winarno, 2025).

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Based on the explanation above, it can be concluded that the scope of the pesantren environment which includes daily activity schedules, availability of sports facilities, the implementation of Physical Education (PJOK) learning, and opportunities for extracurricular sports activities has the potential to influence students' cardiovascular fitness levels. Therefore, it is important to conduct a more in-depth study on the influence of the pesantren environment on the cardiovascular fitness of seventh-grade students at MTs Manbaul Hikam through objective measurements such as the PACER Test, supported by interviews as contextual data.

## **2. Methodology**

### ***Type of Research***

This study employed a quantitative approach using a descriptive method. Descriptive research aims to describe the actual condition of a variable as it naturally occurs, without manipulation (Sugiyono, 2022; Creswell & Creswell, 2018). The variables measured in this study were students' cardiovascular fitness levels assessed through the PACER Test, as well as the influence of the Islamic boarding school environment, which was analyzed through supporting information obtained from interviews (Fraenkel et al., 2019). The quantitative approach was chosen because the PACER Test produces objective numerical data in the form of the number of laps completed, which can be statistically processed to describe students' fitness levels (Meredith & Welk, 2010). In addition, this study also utilized supporting qualitative data obtained through interviews with selected informants, namely a physical education teacher, one boarding school supervisor or school principal, and three students as participants in physical activities, in order to strengthen the analysis related to the boarding school environment and students' daily activities (Pratiwi et al., 2023). Although interviews were conducted, this study does not constitute a mixed-methods design because the primary analysis remained focused on quantitative data from the PACER Test, while qualitative data functioned only as contextual support (Creswell, 2014).

### ***Time and Place of Research***

The study was conducted over a period of two months, from September 2025 to October 2025, at MTs Manba'ul Hikam and Manba'ul Hikam Islamic Boarding School, Putat, Tanggulangin, Sidoarjo. The location was selected based on the characteristics of the boarding school, which implements a full boarding system, allowing researchers to examine the relationship between students' daily routines and their cardiovascular fitness levels (Zuhri & Hidayat, 2021).

### ***Research Target or Objective***

The target population of this study was all seventh-grade students who reside in the Islamic boarding school and participate in the entire range of boarding school activities, as boarding school students are characterized by structured daily routines and continuous engagement in both academic and religious activities, which distinguish them from students in non-boarding educational settings (Zuhri &

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Hidayat, 2021). The main objective of this research was to obtain an overview of students' cardiovascular fitness levels and to analyze how aspects of the boarding school environment such as activity schedules, physical activities, facilities, and daily regulations may potentially influence those fitness conditions (Corbin et al., 2014).

### ***Research Subjects***

The research subjects consisted of all seventh-grade students at MTs Manba'ul Hikam, totaling 174 students distributed across five classes. No grouping based on educational levels was applied, as the study focused on a single educational level that was considered the most appropriate for measuring cardiovascular fitness within the context of early-stage development in an Islamic boarding school (Bailey et al., 2013). The selection of seventh-grade students as research subjects was based on concrete and logical considerations. Seventh-grade students are at an age where they are newly entering the MTs level and are still in the adaptation phase to a new learning environment, including adjustments to physical activity patterns, discipline, and the daily routines of boarding school life (Santrock, 2019). Furthermore, seventh-grade students are not yet burdened with final examinations, allowing data collection to be conducted more optimally without disrupting their learning activities (Rijal & Winarno, 2025). This study also involved five qualitative informants, namely one physical education teacher, one boarding school supervisor or principal, and three students as active participants in physical activities.

### ***Research Instruments***

#### **a. PACER Test**

Students' cardiovascular fitness was measured using the PACER Test (Progressive Aerobic Cardiovascular Endurance Run), which is a commonly used physical fitness assessment tool in research conducted in Indonesia (Meredith & Welk, 2010). The PACER Test measures students' ability to run back and forth along a 20-meter track, following audio beeps that progressively increase in speed at specific intervals. The results of this test are expressed as the number of laps successfully completed until students fail to follow the beep signal twice consecutively (American College of Sports Medicine, 2021).

Several studies in Indonesia have utilized the PACER Test as an instrument to measure physical fitness. For example, Feri Johanis et al. (2024) found a relationship between nutritional status and physical fitness among elementary school students using the PACER Test as the primary measure of cardiovascular fitness (Nurhaswinda et al., 2025). In addition, Sadewo, Yudasmara, & Dewi (2024) also used the PACER Test to assess the physical fitness levels of vocational high school students and found that most students were categorized as having low to very low fitness levels. The PACER Test results were then processed quantitatively and categorized into five levels: Very Low, Low, Moderate, Good, and Very Good (Warni et al., 2024).

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### b. Semi-Structured Interviews

Semi-structured interviews were conducted to collect qualitative data supporting the results of cardiovascular fitness measurements obtained through the PACER Test. The interview informants included a physical education teacher, a boarding school supervisor or principal, and three seventh-grade students of MTs Manba'ul Hikam (Creswell & Creswell, 2018). The interview guidelines were systematically designed to explore information related to the boarding school environment, including students' daily physical activity patterns, levels of participation in sports extracurricular activities, availability and utilization of sports facilities, and the impact of boarding school schedules on students' time and opportunities to engage in physical activity (Pratiwi et al., 2023).

Data obtained from the interviews were used as supporting data to strengthen and clarify the quantitative findings from the PACER Test. Interview data analysis was conducted thematically to identify factors that influence students' cardiovascular fitness, without the intention of performing statistical testing (Braun & Clarke, 2006). The use of interviews was based on practices in physical education research that integrate field test data with contextual information about the educational environment to understand the relationship between students' living environments and fitness outcomes (Pratiwi et al., 2023).

## 3. Results and Discussion

The data were collected using the PACER Test instrument to measure students' cardiovascular fitness levels. This test produces objective scores in the form of the number of laps or shuttles successfully completed by each student. After scoring, the results were processed into quantitative data and analyzed descriptively using percentages (%) to classify students' cardiovascular fitness levels based on established norms (Warni et al., 2024). The PACER Test norm categories for students aged 12–13 years, differentiated by gender, are presented in Table 1.

Table 1. PACER Test Norms for Ages 12–13

Age	Category	Male	Female
12 years	<b>Very Low</b>	≤ 32	≤ 15
13 years		≤ 41	≤ 23
12 years	<b>Low</b>	33 - 47	16 - 24
13 years		42 - 58	24 - 32
12 years	<b>Moderate</b>	59 - 79	25 - 32
13 years		59 - 75	33 - 41
12 years	<b>Good</b>	64 - 71	76 - 81
13 years		33 - 40	42 - 50
12 years	<b>Very Good</b>	≥ 72	≥ 41
13 years		≥ 83	≥ 51

Based on the norm categories in Table 1, students' PACER Test scores were classified into five categories: very low, low, moderate, good, and very good. The distribution of PACER Test results for Grade 7 students at MTs Manba'ul Hikam Sidoarjo according to these categories is summarized in Table 2.

Table 2. PACER Test Results of Grade 7 Students at MTs Manba'ul Hikam Sidoarjo

Category	Total	Male	Female
Very Low	146	64	82
Low	21	9	12
Moderate	7	0	7
Good	0	0	0
Very Good	0	0	0
<b>Total</b>	<b>174</b>	<b>73</b>	<b>101</b>

Based on the PACER Test results table, the data were then analyzed in the form of percentages to determine the percentage results for each PACER Test norm category, which are presented in Table 3 as follows:

Table 3. Percentage Data Analysis for Each PACER Test Category

Category	Total	%	Male	%	Female	%
Very Low	146	83,9	64	87,7	82	81,2
Low	21	12,1	9	12,3	12	11,9
Moderate	7	4,0	0	0	7	6,9
Good	0	0	0	0	0	0
Very Good	0	0	0	0	0	0
<b>Total</b>	<b>174</b>	<b>100%</b>	<b>73</b>		<b>101</b>	

To provide a clearer visual representation of the distribution of students' cardiovascular fitness levels, the percentage results from the PACER Test analysis were transformed into a diagram, as presented in Figure 2:

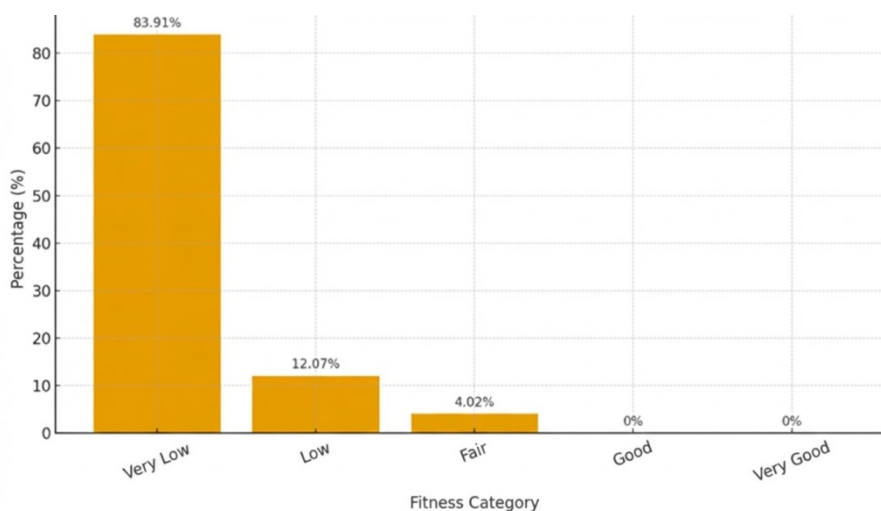


Figure 2. Diagram of Percentage Results for Each Pacer Test Norm Category

Based on the results of the pacer test conducted and analyzed on 174 seventh-grade students of MTs Manba'ul Hikam Sidoarjo as the research sample, consisting of 73 male students and 101 female students, the highest dominance was found in the *very low* category, with a total of 146 students or 83.9% of the entire sample, comprising 64 male students and 82 female students. The *low* category included 21 students or 12.1% of the total sample, consisting of 9 male students and 12 female

students. The *moderate* category consisted of 7 students or 4.0% of the total sample, all of whom were female students. Meanwhile, no students reached the *good* or *very good* categories (0%). From the results of the study conducted through the pacer test involving 174 seventh-grade students of MTs Manba'ul Hikam, it can be analyzed that the majority of students' cardiovascular fitness levels fall into the *very low* category. The percentage in this category appears as the largest compared to other categories. Even when all categories other than *very low* are combined, their total still does not exceed the *very low* category.

Based on the analyzed pacer test data and its conversion into diagram form, the results indicate that the overall cardiovascular fitness level of 174 seventh-grade students of MTs Manba'ul Hikam consisting of 71 male students and 101 female students is dominated by the *very low* category, with a percentage of 83.9%. These results constitute a finding that students of MTs Manba'ul Hikam, who reside in the Manba'ul Hikam Islamic boarding school in Sidoarjo, have very low levels of cardiovascular fitness. When this finding is compared with interview data and field observations, it becomes evident that the boarding school environment plays a role in influencing students' fitness levels.

Based on interviews, the physical education (PJOK) teacher explained that the physical education curriculum at MTs Manba'ul Hikam is essentially the same as that of regular schools, except for the separation between male and female students in accordance with boarding school policies. This separation is not a major obstacle in PJOK learning, as lesson schedules have been well organized. However, the teacher stated that the use of the sports field is often limited due to sharing space with other class activities. This situation causes the intensity and movement space for students to be less than optimal.

The boarding school environment is also characterized by very dense daily activities. Students not only participate in formal school lessons but also engage in other activities such as morning Qur'an recitation, diniyah school, evening Qur'an recitation, *takror* (group study), and other boarding school programs. This packed schedule leaves students with very little free time to engage in additional physical activities. Based on interviews with boarding school supervisors, it is known that additional sports activities are mainly reserved for students who will participate in competitions, while most students only receive physical exercise through PJOK lessons and extracurricular activities for those who are interested.

These conditions affect students' cardiovascular fitness. The daily physical activities performed tend to be light and unstructured, and therefore do not adequately train aerobic endurance. This was clearly observed during the implementation of the pacer test, where many students especially female students experienced rapid fatigue even after completing only a small number of laps. This finding indicates that the boarding school environment has not yet fully provided sufficient stimulus to continuously improve students' heart and lung endurance.

In addition to physical activity, rest patterns are also an important factor closely related to the boarding school environment. The boarding school has established a

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sleep schedule with a curfew at 10:00 p.m.; however, interview results show that many students delay bedtime until late at night due to the habit of chatting with roommates. Insufficient rest time, combined with full-day activities from morning until night, greatly affects students' physical condition and contributes to the low pacer test results obtained. Restrictions on students' mobility also impact their fitness levels. Students are not allowed to freely leave the boarding school to engage in physical activities outside. Although some students are occasionally permitted to jog for example, on Friday mornings this activity is not carried out regularly and does not involve all students. With these limitations, opportunities for students to train cardiovascular fitness outside PJOK class hours are very limited.

From a policy perspective, support from boarding school leadership plays a crucial role. Boarding school supervisors stated that moral support, time management, and leadership policies are key factors in sustaining sports activities. This can be seen from students' achievements in sports and arts competitions (*porseni*) as well as efforts by the school and boarding school to improve sports facilities. Furthermore, extracurricular activities have begun to be directed according to students' interests so that their potential can develop. However, these efforts are still more impactful for students who participate in competitions, while for seventh-grade students in general, the impact on cardiovascular fitness has not been evenly distributed.

Interestingly, interview results with students show that their interest and enthusiasm for sports are actually quite high. Students expressed that PJOK lessons are among the activities they enjoy and look forward to the most. They also feel accustomed to the dense schedule of boarding school activities. However, this enthusiasm is not yet aligned with their physical condition. This indicates a gap between students' interest in sports and the boarding school environment's support in providing sufficient time, facilities, and opportunities for adequate physical activity. Thus, the low cardiovascular fitness of seventh-grade students at MTs Manba'ul Hikam is not solely caused by individual factors but is also influenced by the overall boarding school environment. An environment filled with academic and religious activities, limited sports facilities, suboptimal rest patterns, and restricted opportunities for physical activity outside PJOK lessons collectively shape students' fitness conditions.

The results of this study emphasize that improving students' cardiovascular fitness in a boarding school environment requires a comprehensive approach. PJOK lessons alone are insufficient without support from boarding school policies that provide greater space for physical activities, more disciplined rest time management, and adequate provision of facilities.

#### **4. Conclusion**

This study aims to evaluate the impact of the pesantren environment on the cardiovascular fitness of seventh-grade students at MTs Manbaul Hikam. Based on the research findings, it can be concluded that the overall cardiovascular fitness of the students has not yet reached an optimal level. This condition is not caused by

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restrictions on physical activity within the pesantren environment, but rather is more influenced by the students' dense daily activity patterns as well as time management and rest practices that are not yet fully balanced. The pesantren environment has provided sufficient opportunities for the implementation of Physical Education (PJOK) learning and sports extracurricular activities for interested students, supported by policies and encouragement from the pesantren leadership. Students also demonstrate high interest and enthusiasm for sports activities. However, the tight schedule of pesantren activities and irregular rest habits are factors that affect students' physical endurance, particularly their cardiovascular fitness. Therefore, this study successfully demonstrates that the scope of the pesantren environment influences students' cardiovascular fitness through the regulation of daily activities and the lifestyle patterns of the santri. Future research is recommended to examine structured physical activity interventions and improved rest-time management in order to enhance students' cardiovascular fitness in the pesantren setting.

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