COMPETITOR:
JURNAL PENDIDIKAN KEPELATIHAN OLAHRAGA
e-ISSN: 2657-0734 & p-ISSN: 2085-5389 ‖ Volume 17, Number 2, 2025 ‖ P.1743-1753

The Relationship between Physical Fitness Level and Pulse Rate, and Blood Pressure in 8th Grade Students of MTS Nurul Ulum Welahan

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ABSTRACT

This study analyzed the relationship between physical fitness (VO_2max) with pulse rate and blood pressure in 58 eighth-grade students of MTs Nurul Ulum Welahan Jepara, by measuring VO_2max through a beep test as well as pulse rate and blood pressure before and after physical activity. The majority of students were classified as moderate fitness category (3) with (VO_2max 31-46 ml/kg/minute) with an average pulse rate of 95 bpm, an average systolic blood pressure of 129.38 mmHg (range 94-204 mmHg), and diastolic 77.48 mmHg (range 53-104 mmHg), including several cases of high systolic blood pressure. Pearson correlation analysis showed a significant weak negative relationship between physical fitness and heart rate (r = -0.287; p = 0.030), as well as a significant positive relationship with moderate to strong strength between physical fitness and diastolic (r = 0.576; p = 0.000) and systolic (r = 0.682; p = 0.000) blood pressure. These positive findings differ from the general literature and are thought to be influenced by post-intense physical activity measurements and the characteristics of adolescents during their developmental period. This study emphasizes the importance of physical activity in maintaining adolescent cardiovascular health and the need for contextual interpretation of physiological measurement results, particularly blood pressure, as a basis for developing physical fitness improvement programs in schools.

ARTICLE HISTORY
Received: 2025/00/22
Accepted: 2025/00/26
Published: 2025/06/29

KEYWORDS
Relationship;
Physical Fitness Level;
Pulse Rate;
Blood Pressure;
Students.

AUTHORS' CONTRIBUTION
A. Conception and design of the study;
B. Acquisition of data;
C. Analysis and interpretation of data;
D. Manuscript preparation;
E. Obtaining funding

Cites this Article : Atmaja, Rizki Aryayudha; Qoriah, Anirotul. (2025). The Relationship between Physical Fitness Level and Pulse Rate, and Blood Pressure in 8th Grade Students of MTS Nurul Ulum Welahan. **Competitor: Jurnal Pendidikan Kepelatihan Olahraga**. 17 (2), p.1743-1753

INTRODUCTION

Exercise is a physical activity that can be done by anyone, from children to the elderly (Maksum, 2018). Therefore, exercise is vital for human health. However, various types of exercise have undergone significant changes in line with the busy lives and workloads of today's people. Many health experts state that some people do not exercise regularly every day.

Health and fitness are basic human needs that can only be achieved through enjoyable and sustainable physical activity. This process requires perseverance and consistency, as it cannot be achieved instantly. A balance between physical challenges

and physical fitness is crucial for supporting optimal performance and maintaining overall health (Muspita et al., 2018).

According to (Suwanto et al., 2021), measuring pulse rate and blood pressure are crucial indicators of health and fitness. A normal pulse rate ranges from 60-100 beats per minute and functions to distribute oxygen throughout the body. When exercising, especially for adolescents, the pulse rate should not exceed 160 beats per minute, as this can be harmful to heart health. Therefore, checking your pulse before and after physical activity is important to ensure the body is not overexerting itself, given that the heart is a vital organ. Furthermore, (Ahmad et al., 2024) revealed that blood pressure also serves as a physiological indicator reflecting general health and the body's adaptation to intensive physical activity, so training loads need to be adjusted individually.

Madrasah Tsanawiyah Nurul Ulum, an Islamic-based junior high school located in Welahan District, Jepara, has experienced a decline in student physical activity year after year, exacerbated by low self-confidence, low exercise awareness, and limited extracurricular sports options. Interviews with the physical education teacher and 10 students revealed that at home, they spend more time on passive activities such as watching television, playing PlayStation, playing online games, and using their mobile phones for up to 5-7 hours per day, leading to a sedentary lifestyle that negatively impacts students' physical fitness and health. Meanwhile, in the school environment, only a small number of male students are enthusiastic about playing soccer spontaneously during breaks, while other students prefer to spend time in the canteen and around the school.

Given these conditions, this research is highly relevant and urgent to determine the extent to which students' physical fitness levels are related to health indicators such as pulse rate and blood pressure. The results are expected to provide useful scientific data as a basis for developing targeted physical fitness improvement programs tailored to student needs. Furthermore, the research findings can also be used as considerations for schools to review strategies for developing physical activity and sports to create a healthier and more active school environment.

The researchers have reviewed previous research. A study (Wedri et al., 2021) entitled "Physical Activity Levels Associated with Blood Pressure of Workers at Home During the COVID-19 Pandemic in Seririt Village" showed that 45.6% of adult worker respondents had moderate levels of physical activity, with 38.2% having normal blood pressure. Statistical analysis demonstrated a significant relationship between physical activity and blood pressure (ρ-value = 0.004 < α = 0.05). These findings confirm that physical activity, as a component of physical fitness, plays a crucial role in blood pressure stability. This principle applies universally, including to adolescents, because physical activity affects the cardiovascular system in all age groups. Furthermore, a longitudinal study by (Wellman et al., 2020) entitled "Intensity and frequency of physical activity and high blood pressure in adolescents: A longitudinal study" examined 993 adolescents in Montreal, Canada, showing that 8% of participants experienced elevated blood pressure (120-129/<80 mmHg) and 3.2% had hypertension (≥130/≥80 mmHg). Regular physical activity with moderate to high intensity was shown to reduce the risk of high blood pressure, even after controlling for variables such as

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age, gender, maternal education, body mass index, and cigarette and alcohol consumption. These findings strengthen the evidence that good physical fitness, resulting from regular and intense physical activity, is closely associated with stable blood pressure in adolescents, showing consistent relevance across continents.

METHODS

This study adopted a quantitative approach with a correlational design, chosen for its ability to measure and analyze objective and numerical relationships between variables, namely physical fitness, pulse rate, and blood pressure. Quantitative methods, also known as traditional, positivistic, or scientific methods (because they meet scientific principles such as concrete/empirical, objective, measurable, rational, and systematic), as well as discovery methods, are based on the philosophy of positivism and produce numerical data for statistical analysis (Sugiyono, 2009:7). Correlational research specifically aims to identify the existence, direction (positive/negative), and strength of significant relationships between variables, without the intention of establishing a cause-and-effect relationship.

In this study, all 58 eighth-grade students at MTs Nurul Ulum Welahan, Jepara, served as both the population and the research subjects. A population is defined as a generalization area encompassing objects/subjects with certain qualities and characteristics to be studied to draw conclusions, not only regarding their numbers but also regarding all their characteristics (Sugiyono, 2009:80). The selection of eighth-grade students was based on their active growth period and the research needs related to physical fitness, pulse rate, and blood pressure. Due to the relatively small population size and within the researcher's capabilities, sampling was not used. Instead, a census approach was applied, in which all members of the population participated as respondents, ensuring more accurate and representative data of the actual population, considering that the sample is a subset of the population that must be representative if the population is too large to be studied in its entirety (Sugiyono, 2009: 81).

Data collection in this study was conducted through several main stages: First, a Physical Fitness Test (VO_2max) using a multistage running test (beep test) with a stopwatch and voice recording as aids. Students ran 20 meters back and forth to a rhythm that gradually increased until they could not keep up with the pace twice in a row. The final level and stage results were then converted to an estimated VO_2max using the formula VO_2max = 31,025 + (3,238 x speed) – (3,248 x age) + (0.1536 x age x speed), with reference to the fact that increased BMI can reduce VO_2max (Wibowo & Dese, 2019; Pacholek, 2023). Second, Pulse Measurement was carried out twice (before and after the fitness test) by a clinic nurse using the palpation method on the wrist for 60 seconds using a stopwatch. Third, Blood Pressure Measurement was carried out by a clinic nurse using a digital sphygmomanometer in a quiet sitting condition, both before and after the test to see the physiological response. Fourth, Data Recording and Documentation were carried out directly and carefully in the instrument sheet and documented for validation. Furthermore, to ensure data validity, the researchers implemented: Instrument Validity

Testing (a standardized VO_2max test and valid/calibrated measuring instruments), Method Triangulation (comparing the results of fitness tests, pulse rate measurements, and blood pressure), Procedural Standardization (consistency in test and measurement implementation, including the involvement of medical personnel), Careful Data Recording (by researchers and assistants on observation sheets), and Statistical Testing to verify consistency and significant relationships between variables.

This research data analysis was conducted quantitatively to determine the relationship between physical fitness (VO_2max) and students' pulse rate and blood pressure. The analysis process involved five steps: First, Data Processing, which involves collecting fitness test (beep test), pulse rate, and blood pressure data into a table, then processing it using a statistical program such as Microsoft Excel or SPSS. Second, Prerequisite Analysis Tests, including the Normality Test (Kolmogorov-Smirnov or Shapiro-Wilk) to check data distribution, and the Homogeneity Test (if necessary) to check for equality of variance. Third, the correlation test, using the Pearson test (if the data is normal) or Spearman test (if the data is not normal) to determine a significant relationship between VO_2max and heart rate and blood pressure. Fourth, the interpretation of results, where the correlation coefficient (r) and significance value (p-value) are interpreted based on the strength of the relationship (very weak to very strong). Fifth, the conclusion drawing, which is carried out based on the results of the statistical test and adjusted to the problem formulation and research hypothesis.

RESULTS AND DISCUSSION

Result

This study involved 58 students aged 13-15 at Mts Nurul Ulum Welahan. The data was then categorized based on the fitness level of each student who had taken the VO2max test (beep test) using the VO2max calculation formula.

Table 1.
VO2max score results

Student Name	Age (years)	Level	Shuttle	Speed (km/h)	VO2max (ml/kg/min)	Fitness Category
ABDULLAH KHAQQUTTAUHID	15	2	5	9	32,18	3
ADITIAN NAZIM	14	3	4	9,5	36,74	3
ADITYA DWI SAPUTRA	14	2	7	9	34,04	3
AHMAD RIDHO WALIA. A	14	3	3	9,5	36,74	3
AMILIA NOVAI LYANA	14	2	6	9	34,04	3
ATIYATUL MUNA	14	2	8	9	34,04	3
BERLIYANA FEBRIYANTI	14	2	8	9	34,04	3
FATIMAH ZAHRA KHOIRIL B	13	4	1	10	41,14	2
FIKA OKTAVIA FAJRINA	14	3	4	9,5	36,74	3
FIQA LUTFANA	14	2	3	9	34,04	3
INTAN NISFUL LAILA	14	2	3	9	34,04	3
KHOIRUN NADIRA	14	3	2	9,5	36,74	3
KHOLIS SYAIFUDIN	15	3	1	9,5	34,95	3
M. ABIB ABHAM	15	3	1	9,5	34,95	3
M. KEVINARA FAJRI ZIDNI H	14	4	4	9,5	39,43	3
M. RIDWAN	15	2	3	9	32,18	3
MUHAMMAD ABU BAKAR A	14	3	3	9,5	36,74	3

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Student Name	Age (years)	Level	Shuttle	Speed (km/h)	VO2max (ml/kg/min)	Fitness Category
MUHAMMAD KHUSAIN N	14	3	1	9,5	36,74	3
MUHAMMAD WAHYU BUDI U	14	5	5	10,5	42,13	2
MUHAMMAD NUR FEBRIYANTO	14	3	4	9,5	36,74	3
NAIWA AULIA FAHRUDI	14	4	1	10	39,43	3
NUR INAYAH	14	3	1	9,5	36,74	3
PRADIPTA KIRANA YUSTIN	13	3	1	9,5	38,53	3
RAVKA ABDULLAH NAHIIB	13	5	1	10,5	43,76	2
RAKA DWI SAPUTRA	14	3	1	9,5	36,74	3
SHINTA INTANA HARIATI	15	3	1	9,5	34,95	3
SYAUQI ROHMATULLOH	14	5	1	10,5	42,13	2
SYIFA KHOIRUN NISROKHAH	14	3	1	9,5	36,74	3
ZABIN KHOILUR ROHMAN	14	6	1	11	44,82	2
AHMAD KHAFID M.	14	3	1	9,5	36,74	3
AHMAD RABILILADHOMADHON	14	2	1	9	36,74	3
ANANDA NASYYA APRILIA	14	2	1	9	36,74	3
ARTIKA FITRIANI	13	2	1	9	35,91	3
ASYROF KHOIRUL AZAM	15	4	1	10	37,72	3
AZZURA INDRI LESTARI	14	2	1	9	34,04	3
FITROTUL AMALIA	14	2	1	9	34.04	3
ILMANIA RAMADHANI	14	3	1	9,5	36,74	3
IRKHAM NASUKA	14	3	7	9,5	36,74	3
LINTANG DIAZ SETIAWAN	14	3	3	9,5	36,74	3
LUQMAN ROSIDIN HASBI	14	3	5	9,5	36,74	3
MUHAMMAD AHDA ROULF F.	14	2	1	9	34,04	3
MUHAMMAD DANIEL G.	14	2	1	9	34,04	3
MUHAMMAD FAJAR ARRIFAI	15	3	1	9,5	34,95	3
MUHAMMAD FARIZ	14	3	7	9,5	36,74	3
MUHAMMAD HILMY RAFA R.	13	3	1	9,5	38,53	3
MUHAMMAD IDRIS TALENTA	13	6	1	11	46,38	2
MUHAMMAD KHOIRUL AZAM	14	3	1	9,5	36,74	3
MUHAMMAD NUR EFFENDI	14	2	1	9	34,04	3
MUHAMMAD RIZKI ADI S.	15	6	1	11	43,26	2
MUHAMMAD RIZQI ABDULLAH	15	6	1	11	43,26	2
NOOR MUHAMMAD ATTIAHANA	15	2	1	9	31,18	3
RAKHEL PUSPITASARI	14	2	1	9	34,04	3
RIZKI LUTFIANTO	14	4	1	10	39,74	3
SHANTI INTANI HARIATI	15	2	1	9	34,95	3
VANI PEISIE AHMAD ERANGGA	14	3	2	9,5	36,74	3
ZHIFANA HAYASHA ADISTI	14	3	4	9,5	36,74	3
ZIDNI RACHISHTUZ ZAHRA	14	2	1	9	34,04	3
ZULFAN ALI ZAINUL HAQ	14	4	1	10	39,74	3

Based on VO2max data from 58 students aged 13-15 years, VO2max values vary between approximately 31 to 46 ml/kg/min with the majority of students in the moderate fitness category (category 3), indicating aerobic capacity that still needs to be improved. Students with higher levels and speeds of shuttle runs tend to have better VO2max, entering the better fitness category (category 2). These results are in line with other studies that show that the average VO2max of adolescent students is usually in the moderate range, which reflects a condition of physical fitness that is sufficient but not optimal, so that it needs to be improved through regular physical exercise to support students' overall health and physical performance.

Table 2.
Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Physical Fitness	58	1,00	4,00	2,1379	1,20595
Valid N (listwise)	58				

Based on table 2, data on physical fitness conditions were obtained from 58 respondents, with physical fitness having an average value of 2.137 with a score range between 1.00 and 4.00 and a standard deviation of 1.205, indicating that the level of physical fitness of respondents in general is still in the low to moderate category with quite large variations between individuals.

Table 3.
Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pulse	58	70,00	133,00	95,0000	14,40029
Valid N (listwise)	58				

Based on table 3, data on pulse rate conditions were obtained in 58 respondents, with the average pulse rate of respondents being 95 beats per minute with a minimum value of 70 and a maximum of 133 beats per minute, and a standard deviation of 14.40 which indicates a pulse rate within the normal range but with quite significant variations, influenced by the level of physical activity and health conditions of each individual.

Table 4.
Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Tekanan Darah Sistolik	58	94,00	204,00	129,3793	19,30987
Tekanan Darah Diastolik	58	53,00	104,00	77,4828	12,16732
Valid N (listwise)	58				

Based on table 4, the blood pressure conditions measured in 58 respondents consisted of systolic and diastolic blood pressure with an average recorded at 129.38 mmHg with a range of 94 to 204 mmHg and a standard deviation of 19.31, for systolic blood pressure, while diastolic blood pressure averaged 77.48 mmHg with a range of 53 to 104 mmHg and a standard deviation of 12.17.

Table 5.
Test of Normality One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		58
Normal parameters[a.b]	Mean	,0000000
	Std. Deviation	,64852156
Most Extreme Differences	Absolute	,092
	Positive	,092
	Negative	-,082
Test Statistic		,092
Asymp. Sig. (2-tailed)		,200[c.d]

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Table 5 shows the results of the data normality test for Unstandardized Residuals using the Kolmogorov-Smirnov method used in this study, with a total of 58 respondents (N=58). The test results show a statistical value of 0.092, with an asymptotic significance value (2-tailed) of 0.200. Referring to the footnotes (c. Lilliefors Significance correction and d. This is a lower bound of the true significance), the significance value obtained of 0.200 is greater than the general significance level (α = 0.05). Thus, it can be concluded that the Unstandardized Residual data is normally distributed, in accordance with the normality assumption required for further statistical analysis, such as the Pearson correlation test.

Table 6.

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Scor	Based on Mean	1,664	14	23	,135
	Based on Median	,530	14	23	,890
	Based on Median and with adjusted df	,530	14	16,000	,881
	Based on trimmed mean	1,563	14	23	,166

Table 6 shows that the results of the homogeneity of variance test using Levene's Test indicate that the significance values (Sig) of the various methods are above 0.05 (ranging from 0.135 to 0.890). This indicates that the data variance for the "Score" variable is homogeneous, thus fulfilling an important assumption for further parametric statistical analysis.

Table 7.

Pulse Correlation Results

		Physical Fitness	Pulse
Physical Fitness	Pearson Correlation	1	-,287*
	Sig. (2tailed)		,030
	N	58	58
Pulse	Pearson correlation	-,287*	1
	Sig. (2-tailed)	,030	
	N	58	58

Table 7 displays the results of the Pearson correlation test between physical fitness (VO2max) and heart rate of 58 respondents. The results show a Pearson correlation coefficient of -0.287 with a significance value (Sig. 2-tailed) of 0.030. A significance value (0.030) smaller than 0.05 indicates a statistically significant negative relationship between physical fitness and heart rate. A correlation coefficient of -0.287 indicates a weak relationship (0.20-0.39), meaning that the higher a person's physical fitness level, the lower their heart rate tends to be.

Table 8.

Diastolic Blood Pressure Correlation Results

		Physical Fitness	Systolic Blood Pressure
Physical Fitness	Pearson Correlation	1	,576*
	Sig. (2tailed)		,00
	N	58	58
Systolic Blood Pressure	Pearson correlation	,576*	1
	Sig. (2-tailed)	,000	
	N	58	58

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Table 8 presents the results of the Pearson correlation test between Physical Fitness (VO2max) and Diastolic Blood Pressure from 58 respondents. A Pearson correlation coefficient of 0.576 was found with a significance value (Sig. 2-tailed) of 0.000. The significance value (0.000) which is much smaller than 0.05 indicates a statistically significant positive relationship between physical fitness and diastolic blood pressure. The correlation coefficient of 0.576 is in the moderate category (range 0.40-0.59), implying that increased physical fitness tends to correlate with increased diastolic blood pressure in this sample, with a fairly significant strength of relationship.

Table 9.
Systolic Blood Pressure Correlation Results

		Systolic Blood Pressure	Physical Fitness
Systolic Blood Pressure	Pearson Correlation	1	,682*
	Sig. (2tailed)		,000
	N	58	58
Physical Fitness	Pearson correlation	,682*	1
	Sig. (2-tailed)	,000	
	N	58	58

Table 9 shows the results of the Pearson correlation test between Systolic Blood Pressure and Physical Fitness (VO_2max) from 58 respondents. The analysis results obtained a Pearson correlation coefficient of 0.682 with a significance value (Sig. 2-tailed) of 0.000. This significance value, which is much smaller than 0.05, indicates a statistically significant positive relationship between systolic blood pressure and physical fitness. The correlation coefficient of 0.682 indicates a strong relationship (in the range of 0.60–0.79), which means that in this sample, an increase in physical fitness levels tends to correlate with an increase in systolic blood pressure.

Discussion

The results of the data analysis presented previously integrate the descriptive characteristics of respondents and variables with findings of a correlation between physical fitness level (VO_2max) and physiological indicators of heart rate and blood pressure. This study involved 58 eighth-grade students at MTs Nurul Ulum Welahan, aged 13-15 years.

In general, respondents' physical fitness levels, based on VO_2max data (beep test), varied between 31 and 46 ml/kg/minute, with the majority of students in the moderate fitness category (category 3). The average physical fitness score was 2.137, with a range of 1.00 to 4.00 and a standard deviation of 1.205, indicating that students' physical fitness levels generally fell into the low to moderate category with significant individual variation. The average pulse rate of respondents was recorded at 95 beats per minute (range 70-133 beats/minute, SD 14.40), indicating a pulse rate within the normal range, but with variations influenced by activity and health conditions. For blood pressure, the mean systolic blood pressure was 129.38 mmHg (range 94-204 mmHg, SD 19.31) and diastolic blood pressure 77.48 mmHg (range 53-104 mmHg, SD 12.17). The maximum systolic blood pressure value, which reached 204 mmHg, is noteworthy, indicating that some respondents had high blood pressure requiring special attention.

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Prerequisite analysis tests showed that the Unstandardized Residual data were normally distributed (Sig. 0.200 > 0.05) and the variance of the "Score" data was homogeneous (Sig. > 0.05), thus supporting the use of the Pearson correlation test. The results of the Pearson correlation analysis indicated a variable relationship between Physical Fitness Level (VO_2max) and the variables Heart Rate, Diastolic Blood Pressure, and Systolic Blood Pressure. Physical fitness was found to have a statistically significant negative relationship with heart rate (r = –0.287; p = 0.030). Although significant, the strength of this relationship was weak. This finding is consistent with physiological principles where increased cardiorespiratory fitness is typically correlated with a lower resting heart rate, as the heart becomes more efficient at pumping blood per beat. Interestingly, the correlation results showed a statistically significant positive relationship between physical fitness and diastolic blood pressure (r = 0.576; p = 0.000), with a moderate strength of relationship. A similar pattern was also found for the relationship between physical fitness and systolic blood pressure, where there was a statistically significant positive relationship with a strong strength (r = 0.682; p = 0.000). This positive relationship, while significant, contrasts with the general literature that often indicates a negative correlation between physical fitness and blood pressure, where increased fitness tends to lower or stabilize blood pressure. A possible interpretation for this finding could be related to the acute physiological response to the intense beep test, given that blood pressure measurements were taken before and after physical activity. The increase in blood pressure that occurs during or shortly after intense physical activity is a normal body response to ensure adequate blood and oxygen supply to working muscles. Furthermore, the specific characteristics of the adolescent population, which is undergoing active growth, such as eighth-grade students, and the considerable individual variability in the baseline data may also influence these correlation results. Therefore, these findings suggest the need for further exploration, taking into account the specific health conditions of the respondents and the potential for other moderating or mediating variables not included in this bivariate correlation analysis.

CONCLUSION

This study found that the majority of eighth-grade students at MTs Nurul Ulum Welahan had moderate levels of physical fitness, with varying VO_2max values, an average heart rate of 95 beats per minute, and relatively high systolic and diastolic blood pressure in some individuals. There was a significant but weak negative relationship between physical fitness and heart rate, and a significant and fairly strong positive relationship between physical fitness and systolic and diastolic blood pressure. This positive relationship differs from the general literature and is likely influenced by the measurements taken before and after intense physical activity and the characteristics of the growing adolescent population.

Based on Pearson correlation analysis, this study found three significant relationships:

1. There was a significant but weak negative relationship between physical fitness and heart rate (r=–0.287; p=0.030). This finding is consistent with the physiological principle that better cardiorespiratory fitness allows the heart to work more efficiently at a lower heart rate.
2. A significant, moderate-strength positive relationship was found between physical fitness and diastolic blood pressure (r=–0.576; p=0.000).
3. A significant, strong-strength positive relationship was found between physical fitness and systolic blood pressure (r=0.682; p=0.000).

The positive association between physical fitness and systolic and diastolic blood pressure in this sample differs from the general literature, which often indicates a negative correlation or a decrease in blood pressure with increasing fitness. Critical interpretation suggests that these results are likely influenced by the measurement conditions, which were conducted before and after intense physical activity (beep test). Increased blood pressure is a normal, acute physiological response during and after intense physical activity to meet the body's metabolic needs. Furthermore, the population characteristics of adolescents, who are still growing, and high individual variability may also be contributing factors to the observed association pattern.

Overall, this study emphasizes the importance of comprehensive evaluation of physical fitness and physiological parameters in adolescents, while also reminding us that blood pressure results need to be interpreted contextually. Limitations such as the correlational design and non-basal measurement limit the generalizability of the results and the drawing of causal conclusions, thus necessitating further research with more comprehensive methods and more controlled variables.

REFERENCES

Ahmad, G., Ghifari, A., Berawi, K. N., Graharti, R., Kurniati, I., Studi, P., Dokter, P., Kedokteran, F., Lampung, U., Fisiologi, B., Studi, P., Dokter, P., Kedokteran, F., Lampung, U., Klinik, B. P., Studi, P., Dokter, P., Kedokteran, F., & Lampung, U. (2024). *Tekanan Darah Pada Atlet : Literature Review Blood Pressure in Athletes : Literature Review*. *14*, 1963–1967.

Araujo, G. De, Gobatto, F. M.-, Papoti, M., Camargo, B., & Amp; Gobatto, C. (2014). Anaerobic and Aerobic Performances in Elite Basketball Players. Journal of Human Kinetics, 42, 137–147. https://doi.org/10.2478/hukin-2014-0068

Bismar, Ahmad Rum & Sahabuddin. (2019). Studi Pelaksanaan Evaluasi Pembelajaran Pendidikan Jasmani Olahraga dan Kesehatan pada Siswa SMP di Makassar. Prosiding. Seminar Nasional Lembaga Penelitian Universitas Negeri Makassar; 103-107.

Hanief, Y.N. (2014). Pengaruh Latihan Pliometrik dan Panjang Tungkai Terhadap Kecepatan Renang Gaya Dada 50 M. Skripsi. Program Studi Pendidikan Kepelatihan Universitas Sebelas Maret Surakarta

Hoffmann, J. J., Reed, J. P., Le iting, K., Chiang, C. Y., & Stone, M. H. (2014). Repeated sprints, high-intensity interval training, small-sided games: Theory and

application to field sports. International Journal of Sports Physiology and Performance, 9(2), 352–357. https://doi.org/10.1123/IJSPP.2013-0189

Maksum, A. (2008). Metodologi Penelitian. Surabaya: Univesity Press.

Maksum. (2018). Jurnal Pendidikan Olahraga dan Kesehatan Volume 11 Nomor 03 Tahun 2023. *Jurnal Pendidikan Olahraga Dan Kesehatan*, *11*, 03. http://ejournal.unesa.ac.id/index.php/jurnal-pendidikan-jasmani/issue/archive

Muspita, M., Kamarudin, K., & Fernando, R. (2018). Profil Physical Fitness Mahasiswa Penjaskesrek Semeter I FKIP UIR Tahun 2015/2016. *Journal Sport Area*, *3*(1), 70–78. https://doi.org/10.25299/sportarea.2018.vol3(1).1306

Nurkholis, Moh. (2015). Kontribusi Pendidikan Jasmani dalam Menciptakan SDM yang Berdaya Saing di Era Global. Prosiding. Seminar Nasional Olahraga UNY Yogyakarta; 192-201.

Pacholek, M. (2023). The influence of verbal encouragement on heart rate, maximum oxygen uptake, and distance covered in young male adults during beep test. *Journal of Men's Health*, *19*(2), 29–35. https://doi.org/10.22514/JOMH.2023.001

Sahabuddin. (2017). Evaluasi Program Pemusatan Latihan Daerah (Pelatda) PON XIX Sulawesi Selatan. Disertasi. Program Studi Pendidikan Olahraga Pascasarjana Universitas Negeri Jakarta.

Suwanto, Y. A., Lusiana, L., & Purnama, Y. (2021). Perbedaan Pulse dan Saturasi Oksigen Sebelum dan Sesudah Senam Bhineka Tunggal Ika (SBTI) di Era Pandemi Covid-19. *Journal of Sport Coaching and Physical Education*, *6*(1), 59–62. https://doi.org/10.15294/jscpe.v6i1.46034

Wedri, N. M., Windayanti, K. A., & Ari Rasdini, I. (2021). Tingkat Aktivitas Fisik Berhubungan dengan Tekanan Darah Pekerja di Rumah Selama Masa Pandemi COVID-19. *Jurnal Gema Keperawatan*, *14*(1), 16–26. https://doi.org/10.33992/jgk.v14i1.1571

Wellman, R. J., Sylvestre, M. P., Abi Nader, P., Chiolero, A., Mesidor, M., Dugas, E. N., Tougri, G., & O'Loughlin, J. (2020). Intensity and frequency of physical activity and high blood pressure in adolescents: A longitudinal study. *Journal of Clinical Hypertension*, *22*(2), 283–290. https://doi.org/10.1111/jch.13806