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Physical Fitness of Smoking Students Class XI State High School 9 Jambi City

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A B S T R A C T

Smoking habits among school-age adolescents have the potential to cause negative health effects, particularly on physical fitness levels. This study aims to describe the physical fitness levels of smoking students in grade XI at State Senior High School 9 in Jambi City based on the results of the Indonesian Physical Fitness Test (TKJI) for ages 16–19 years. This study used a quantitative descriptive method. The study population consisted of all male students in grade XI at SMA Negeri 9 Kota Jambi in the 2025/2026 academic year, totaling 97 students. The study sample was determined using cluster random sampling, resulting in the selection of 20 male students in grade XI Phase F2 as research respondents. Data collection was conducted through smoking habit observation sheets to categorize students into active smokers, occasional smokers, and passive smokers, as well as through the Indonesian Physical Fitness Test (TKJI), which included a 60-meter run, pull-ups, a 60-second sit-up, vertical jump, and a 1200-meter run. Data analysis used quantitative descriptive analysis with percentage calculations. The results of the study show that the physical fitness level of smoking students in grade XI at State Senior High School 9 in Jambi City is generally low, with an average TKJI score of 13.7 (below average category). Based on smoking habits, active smokers had an average TKJI score of 11.25 (poor category), occasional smokers had an average score of 14.33 (moderate category), while passive smokers had an average score of 16.67 (moderate-good category). These results indicate that the more frequently students smoke, the lower their level of physical fitness.

Keywords: *Physical Fitness, Smoking Habits, TKJI, High School Students, Quantitative Descriptive.*

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INTRODUCTIONS

Adolescent health is a strategic aspect that receives global attention because during this period there is the formation of life habits that will be carried over into adulthood. (Organization, 2022) emphasized that regular physical activity, a balanced diet, and avoiding risky behaviors such as smoking are important factors in realizing optimal health in adolescents. Thus, smoking behavior at high school age is a serious threat to the health quality of the younger generation.

Globally, smoking is still a major problem among teenagers. (Organization, 2022) reports that more than 38 million adolescents worldwide use tobacco products, both conventional and electronic cigarettes. These behaviors not only increase the risk of chronic diseases such as lung cancer, heart disease, and respiratory disorders, but also have implications for decreased physical fitness. The nicotine and carbon monoxide content in cigarettes can reduce aerobic capacity and accelerate fatigue.

Physical fitness itself is defined as the condition of a person's ability to perform daily physical activities effectively without experiencing excessive fatigue and still having energy reserves for additional activities. Physical fitness components include heart-lung endurance, muscle strength, flexibility, agility, and speed. In adolescents, physical fitness plays an important role in supporting learning achievement, productivity, and physical development.

If the habit of smoking is present, then physical fitness has the potential to decrease significantly (Prasetyo & Hidayat, 2021).

The situation in Indonesia shows a similar pattern to the events in global conditions. Global Youth Results (Organization, 2019) showed that the prevalence of adolescents aged 13–15 years who smoked reached 18.8%, consisting of 35.5% males and 2.9% females. This data places Indonesia as one of the countries with the highest prevalence of adolescent smokers in Southeast Asia. This fact shows that the habit of smoking in adolescents has become an urgent health problem.

In addition, national data further strengthens the urgency of this problem. The Basic Health Research report shows an increase in the prevalence of adolescent smokers aged 10–18 years from 7.2% in 2013 to 9.1% in 2018 (Riskesdas, 2018). This trend shows that smoking habits are increasingly ingrained among school-age people. Thus, smoking habits (X) need to be studied further to see its relationship with physical fitness (Y) in adolescents at the secondary education level.

The physiological impact of cigarettes on the adolescent body can be seen from the disruption of the respiratory and cardiovascular systems. The content of nicotine, tar, and carbon monoxide decreases lung function, speeds up heart rate, and reduces the distribution of oxygen to the muscles. As a result, aerobic capacity is reduced and causes smoking students to tire out faster than non-smoking students (R. Novitasari et al., 2020). This suggests that there may be a negative relationship between smoking habits and physical fitness.

Some studies support this hypothesis (Prasetyo & Hidayat, 2021a) reported that smoking students had lower VO2Max scores than non-smokers. Research (Putra and Rahayu 2020) also found that smoking high school students in Yogyakarta showed lower physical fitness test results than non-smoking students. Thus, quantitative correlational research can be used to test the significant relationship between smoking habits (X) and physical fitness (Y).

However, not all studies have come to the same conclusions. Thesis research by (Oct. 2024) In MAN 3 students, Nganjuk found that although most of the students were in the category of heavy smokers, statistically there was no significant relationship between smoking habits and physical fitness. This difference raises a discussion about other intermediate variables that may play a role, such as exercise intensity, diet, or genetic factors.

The gap in this study shows the inconsistency of the findings in the field. (Yulianto & Handayani, 2022) assess that differences in physical fitness measurement instruments, variations in smoking intensity, and student backgrounds can affect the results of the study. Therefore, further research with a quantitative approach to correlation at different locations is important to clarify the relationship between the two variables.

Then, at the regional level of Jambi province, a similar problem was also found. Data from Jambi Province Riskesdas (2021) reports that around 23% of high school students in Jambi have tried smoking, with the majority starting the habit at the age of 13–15 years. This shows that high school is a critical period for the emergence of smoking habits (RI, 2021).

In fact, Jambi Province is classified as one with the highest prevalence of adolescent smokers in Sumatra. Reports (RI, 2022) It is stated that smoking behavior among adolescents is increasing along with weak environmental supervision, the influence of peer association, and the lack of education about the dangers of smoking. This condition has the potential to reduce the physical fitness of students in the area.

Research (Santoso & Lestari, 2021) Support these findings by mentioning that students who smoke and have unhealthy lifestyles tend to have lower levels of physical fitness than non-smoking students. This means that smoking behavior is one of the factors that affect the physical quality of adolescents at the local level.

This phenomenon is very similar to that seen in Jambi City. School reports show that there are still many high school students who smoke, both overtly and covertly. The dominant factors that drive this behavior are peer influence, social environment, and lack of parental attention (L. Novitasari et al., 2020).

SMA Negeri 9 Jambi City as one of the big public schools in this city is inseparable from this problem. The results of initial observations showed that there were XI grade students

who had a smoking habit. This raises the question of whether the smoking habit is significantly related to the physical fitness of students in this school. This condition is important to study because physical fitness is one of the main goals of physical education in schools. If smoking habits are proven to be related to a decrease in physical fitness, then it is necessary to carry out appropriate prevention and coaching strategies in physical education programs.

Therefore, this study will enrich the literature on the relationship between smoking habits and the physical fitness of high school students in Indonesia. This study also complements the gap of previous research that has not been consistent in finding the relationship between the two variables.

Based on the above background, it can be concluded that the habit of smoking is one of the factors that is suspected to affect the physical fitness of adolescents. This condition is becoming increasingly important to be researched in high school students who are in a period of growth and development. Therefore, this study is focused on examining the relationship between smoking habits and physical fitness of grade XI students of SMA Negeri 9 Jambi City, so as to provide empirical evidence on the extent to which smoking behavior is related to the level of physical fitness among high school adolescents.

METHODS

Place and Time of Research

This research was carried out at SMA Negeri 9 Jambi City from November 10 to 31, 2025.

Research Design

This study uses a quantitative descriptive research method. The quantitative descriptive method aims to describe or describe the conditions that occur in the field based on data obtained through measurements or observations.

According to Sugiyono (2019), descriptive research is research conducted to determine the value of independent variables, either one or more variables, without making comparisons or connecting them with other variables. In this study, the researcher did not intend to test the relationship between variables, but only described the level of physical fitness of students of class XI smokers of SMA Negeri 9 Jambi City.

The research data was obtained through the Indonesian Physical Fitness Test (TKJI) which was carried out to smoking students. The test results were analyzed using a percentage formula to find out the categories of students' physical fitness levels, namely very good, good, moderate, lacking, and not enough.

Population and Sample

Population is the entire group of individuals or objects that are the target of the research and it is hoped that the results can be generalized (Firmansyah & Dede, 2022). The population in this study is all male students in grade XI of SMA Negeri 9 Jambi City which consists of seven classes, namely F1, F2, F3, F4, F5, F6, and F7 in the 2025 school year.

Samples are a part of the population that is used as a source of data in the study and is considered to be representative of the population (Amin, 2017). The sampling technique used is cluster sampling. Based on this technique, the researcher chose one class as the research sample, namely class XI F2 with a total of 20 students.

Sampling Techniques

The sampling technique used in this study is cluster random sampling. This technique is a method of sampling by randomizing groups or classes, not individuals (Azwar, 2012). This technique is used because the population consists of several classes that have relatively homogeneous characteristics (Hidaya, 2007).

Research Instruments

Research instruments are tools used by researchers to collect data in order to obtain systematic and easy-to-process results (Arikunto, 2006). The instruments used in this study are:

Student Observation Sheet

Observation sheets are used to group students based on smoking habits. This instrument consists of one observational question, namely:

"Are you among the students who smoke at this time?"

The answer options consist of:

Smoking

Sometimes smoking

Non-smoking (passive smokers)

Description:

Smoking: students who consume cigarettes every day.

Occasional smoking: students who smoke at a certain time and not every day.

Non-smoking (passive smoker): students who do not smoke but are in a smoking environment.

This instrument is categorical (nominal) and is used to classify students based on smoking habits.

Indonesian Physical Fitness Test (TKJI)

Physical fitness variables were measured using the Indonesian Physical Fitness Test (TKJI) for the age group of 16–19 years. TKJI consists of five test items, namely:

60-meter dash (speed)

Hanging body lift (arm and shoulder muscle strength and endurance)

Lie down and sit for 60 seconds (abdominal muscle strength and endurance)

Upright jump (leg muscle explosiveness)

1200 meter run (cardiorespiratory endurance)

The final score of physical fitness was obtained from the sum of the scores of the five test items and was classified into categories of very good, good, moderate, poor, and less according to the TKJI norms of 16–19 years old.

Data Collection Techniques

The data collection technique is carried out in two ways, namely:

Filling out a student smoking observation sheet to group students' smoking habits.

The implementation of the Indonesian Physical Fitness Test (TKJI) for sample students in accordance with applicable procedures and regulations.

Data Analysis Techniques

Data analysis uses quantitative descriptive analysis with a percentage formula. This analysis aims to describe the level of physical fitness of smoking students based on the results of TKJI.

The steps of data analysis include: (1) Collecting data on TKJI results from each student. (2) Provide a score according to the TKJI assessment guidelines from the Ministry of Youth and Sports of the Republic of Indonesia. (3) Determine the category of physical fitness level. (4) Calculate the percentage of each category using the formula:

$$P = (f/N) \times 100\%$$

Remarks: P = Percentage f = Frequency of a specific category N = Number of respondents

Interpret the results of the analysis based on the category with the highest percentage as an overview of the physical fitness level of students in grade XI of SMA Negeri 9 Jambi City.

FINDINGS AND DISCUSSIONS

Data Description

This research was carried out at SMA Negeri 9 Jambi City on December 15, 2025. The purpose of this study is to describe the level of physical fitness of class XI smoking students based on the results of the Indonesian Physical Fitness Test (TKJI) for the ages of 16–19 years. In addition, this study also uses smoking habit observation sheets to identify the categories of smokers among students. The population in this study is all male students in grade XI of SMA Negeri 9 Jambi City for the 2025/2026 school year which totals 97 people. From this

population, sampling was carried out using the cluster random sampling technique, which is random sampling based on groups (classes).

The sampling steps are carried out as follows: All students in grade XI are grouped based on study groups (Rombel). Through random lotteries, class XI Phase F2 was selected as a cluster (group) of research samples. From the selected classes, male students were identified who belonged to the categories of active smokers, sometimes smokers, and passive smokers based on smoking habit observation sheets. Based on the results of the identification, 20 male students were obtained who met the criteria and were willing to become research respondents. Thus, 20 male students in class XI Phase F2 were used as a sample of this study.

Description of Student Smoking Habits

Based on the results of observations, smoking students were grouped into three categories of smoking habits, namely active smokers, sometimes smokers, and passive smokers. The distribution of smoking habits of grade XI students of SMA Negeri 9 Jambi City can be seen in the following table:

Table 1 Distribution of Smoking Habits of Male Students

Yes	Categories Smoking Habits	Number of Students	Percentage (%)
1	Active smokers	8	40%
2	Smokers sometimes	9	45%
3	Passive smokers	3	15%
	Quantity	20	100%

Source : Smoking Habit Observation Sheet

Based on the table above, it can be seen that the majority of students (45%) fall into the category of occasional smokers, followed by active smokers (40%) and passive smokers (15%). This shows that most of the male students of grade XI still have the habit of smoking, either actively or occasionally.

Description of Physical Fitness

Based on the results of the physical fitness test in this study was carried out using the Indonesian Physical Fitness Test (TKJI) in male students in grade XI Phase F2 of SMA Negeri 9 Jambi City for the age group of 16-19 years old can be obtained with an average score of 13.7 and is included in the less category.

The distribution of physical fitness from each student of SMA Negeri 9 Jambi City can be presented in the following table:

Table 2 Distribution of Physical Fitness for Male Students

No	Category TKJI	Value Range	Number of Students	Percentage (%)
1	Excellent	22 – 25	0	0%
2	Good	18 – 21	3	15%
3	Medium	14 – 17	7	35%
4	Less	10 – 13	8	40%
5	Less Than Once	5 – 9	2	10%
	Quantity	-	20	100%

Source : Indonesian Physical Fitness Test

Based on the table above, it is known that 8 students (40%) are in the "Less" category, 7 students (35%) are in the "Medium" category, 3 students (15%) are in the "Good" category, and 2 students (10%) are in the "Less Once" category. None of the students were in the "Excellent" category, which indicates that the physical fitness level of smoking students tends to be low.

Description of Physical Fitness Based on Smoking Habits

Based on the results of measurements using the Indonesian Physical Fitness Test (TKJI), the physical fitness level of grade XI students of SMA Negeri 9 Jambi City showed differences based on the category of smoking habits.

In general, students who fall into the active smoker category have the lowest physical fitness scores compared to other groups. This is caused by the high frequency of smoking, so it negatively affects the respiratory system, blood circulation, and muscle work ability.

The group of occasional smokers showed better results than active smokers, but were still in the moderate category. This shows that even though smoking habits are not done every day, harmful substances from cigarettes still have an effect on physical fitness.

Meanwhile, the passive smoking group obtained the best results among the three categories, with the average TKJI score falling into the medium to good category. Even though you don't smoke directly, exposure to cigarette smoke from the environment still has an impact on lung function, although not as much as in active smokers.

To clarify the picture of the difference in fitness level between groups, the following is presented with the results of the description of each category of smoking habits.

Table 3 Physical Fitness Level of Active Smokers

No	They respond	TKJI Value	Category	Remarks
1	R01	11	Less	Low durability, frequent stops when running 1200 m
2	R02	12	Less	Weak arm muscle strength
3	R03	10	Less	Below-average speed and durability
4	R04	9	Less Than Once	Slow 60 m running performance
5	R05	11	Less	Medium abdominal muscle endurance
6	R06	12	Less	Run 1200 m over standard time
7	R07	13	Less	Speed is enough, but stamina is weak
8	R08	12	Less	Low upright jump results
	Average	11,25	Less	-

In the table above, it can be seen that the group of active smokers as many as 8 students have an average TKJI score of 11.25, included in the "Less" category. Most students show weaknesses in aspects of muscle strength and heart-lung endurance. This is due to the effects of daily smoking that inhibits oxygen absorption and decreases lung capacity.

Table 4 Physical fitness level of students sometimes smoking

No	Student Initials	TKJI Value	Category	Remarks
1	R09	14	Medium	Running performance is quite good
2	R10	15	Medium	Sit-up dan vertical jump stabil
3	R11	14	Medium	Sufficient durability
4	R12	13	Less	The 1200 m run is still substandard
5	R13	16	Medium	Good abdominal and leg muscle strength
6	R14	14	Medium	Stable upright jump
7	R15	15	Medium	Good running speed
8	R16	13	Less	Weak arm strength
9	R17	15	Medium	Sufficient aerobic endurance
	Average	14,33	Medium	-

However, students who smoke sometimes as many as 9 students obtained an average TKJI score of 14.33 in the "Medium" category. This group showed better physical fitness than active smokers, especially in terms of speed and leg muscle power. However, some students still have weaknesses in endurance. Less frequent smoking appears to reduce the negative impact on body fitness.

Table 5 Physical Fitness Level of Passive Smokers Students

Yes	Student Initials	TKJI Value	Category	Remarks
1	R18	17	Medium - Good	Good durability and strength
2	R19	16	Medium	Speed and coordination are quite high
3	R20	17	Medium - Good	High jump vertical yield
	Average	16,67	Medium - Good	-

Meanwhile, passive smoking students (3 students) obtained an average TKJI score of 16.67 in the category "Medium towards Good". These results show that despite exposure to cigarette smoke, their physical condition is relatively better than that of students who smoke directly. The impact of cigarette smoke remains, but it is not as heavy as the effect on active smokers.

Based on the table above, information was obtained that 8 active smokers had a low level of physical fitness in the poor category, sometimes smoking as many as 9 students were in the Medium category, with better physical fitness, while 3 passive smokers had the highest physical fitness in the Medium-Good category.

Thus, the more often students smoke, the lower the TKJI score obtained. Therefore, it shows that the habit of smoking has a bad impact on the physical fitness of grade XI students of SMA Negeri 9 Jambi City.

Discussion

Based on the results of a study that has been conducted on 20 male students in grade XI of SMA Negeri 9 Jambi City, it is obtained that the level of physical fitness of smoking students in general is relatively low (category "Less") with an average total TKJI score of 13.7. If reviewed based on smoking habits, it can be seen that there are quite clear differences between each group. Active smoking students have an average TKJI score of 11.25 (Less category), sometimes smoking students have an average of 14.33 (Medium category), while passive smokers have an average of 16.67 (Medium-Good category). These results show that the higher the intensity of smoking, the lower the level of physical fitness that students have.

The Effect of Smoking Habits on Physical Fitness

Smoking habits have a direct impact on the respiratory system and blood circulation. Chemicals in cigarettes such as nicotine, tar, and carbon monoxide can inhibit the delivery of oxygen to muscles and body tissues. As a result, lung function decreases, heart rate increases, and aerobic capacity decreases. This results in smoking students feeling tired faster when doing physical activities that require high endurance, such as running 1200 meters in TKJI.

This phenomenon can be seen in the results of this study, where active smoking students have low scores, especially on the components of heart-lung endurance and arm muscle strength. Smoking activities carried out every day cause the body to lack oxygen during physical activity, thus affecting physical performance abilities.

This result is in line with the opinion of Guyton & Hall (2016) who explained that carbon monoxide from cigarettes binds more strongly to hemoglobin than oxygen, thereby reducing the supply of oxygen to the body's tissues. This condition inhibits the process of aerobic metabolism and decreases immunity.

Comparison between Smoking Habits Groups

Differences in physical fitness levels between active, occasional, and passive smokers showed a negative relationship between smoking frequency and physical fitness levels.

The active smoking group tended to have low physical ability, fatigue quickly, and poor heart-lung endurance.

The group of smokers sometimes had moderate performance because the intensity of smoking was milder.

The passive smoker group still showed better results because they did not consume cigarettes directly, even though they were still exposed to environmental cigarette smoke.

This is in line with the results of research by Prasetyo and Hidayat (2021) which stated that smoking habits have a significant negative relationship with the VO_2Max value of high school students. The more often students smoke, the lower the ability of the lungs to deliver oxygen throughout the body.

This study also supports the results of Putra and Rahayu (2020) who found that smoking students had lower TKJI scores than non-smokers at SMA Negeri 2 Yogyakarta. In addition, R. Novitasari et al. (2020) affirm that smoking significantly decreases muscle endurance and the work efficiency of the cardiovascular system. However, the results of this study are different from the findings of Oktalia (2024) which states that there is no significant relationship between smoking habits and physical fitness levels in MAN 3 Nganjuk students. This difference may be due to other factors such as a healthy lifestyle, regular exercise activities, and varying smoking durations.

Implications for Student Physical Fitness

The results of this study provide an idea that smoking behavior has the potential to reduce the level of physical fitness in school-age adolescents. Students who actively smoked daily showed significant decreases in endurance (1200-meter run) and muscle strength (pull up) compared to students who did not smoke at all. This can be explained by the fact that nicotine is a vasoconstrictor, that is, it constricts blood vessels and reduces the supply of oxygen to the muscles. In addition, tar and carbon monoxide in cigarettes can reduce the efficiency of oxygen exchange in the lungs. As a result, smoking students are more likely to feel tired and have difficulty maintaining physical activity for a long time.

The results of this study reinforce the theory and findings of previous research that smoking habits have a negative relationship with physical fitness (Prasetyo & Hidayat, 2021;

Putra & Rahayu, 2020; Novitasari et al., 2020). However, this study also provides novelty in the form of mapping fitness levels between categories of smokers (active, occasional, and passive) in the local context in Jambi City.

CONCLUSION

Based on the results of research that has been conducted on the physical fitness level of smoking students in grade XI of SMA Negeri 9 Jambi City in 2025, it can be concluded that the level of physical fitness of smoking students in general is still relatively low. The results of the Indonesian Physical Fitness Test (TKJI) conducted on 20 smoking students showed a total average score of 13.7 which was included in the "Less" category according to TKJI norms aged 16-19 years. This condition indicates that most students do not have the optimal endurance, strength, and physical speed to support daily physical activities. In addition, it was found that there was a difference in the level of physical fitness based on students' smoking habits. Active smoking students totaling 8 people obtained an average TKJI score of 11.25 in the "Less" category, while students who smoked sometimes as many as 9 people had an average score of 14.33 in the "Medium" category. The passive smoking students totaling 3 people showed the highest average score of 16.67 in the "Moderate-Good" category. These results show a tendency that the more often students smoke, the lower their level of physical fitness. Smoking habits have been shown to have a negative impact on the physical fitness of school adolescents. The content of harmful substances in cigarettes, such as nicotine and carbon monoxide, can inhibit the supply of oxygen to the muscles and lungs, thereby reducing aerobic capacity and the body's work efficiency. As a result, students who smoke, especially active smokers, are more likely to experience fatigue when doing physical activity, especially on endurance-demanding tests such as running 1200 meters.

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