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Management of Physical Fitness Programs to Enhance the Performance of Grade Tenth Students at SMA Negeri 2 Jambi City through Physical Education

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ABSTRACT

This study aimed to examine students' physical fitness levels at SMA Negeri 2 Jambi City as an empirical basis for supporting Physical Education (PJOK) learning and improving students' physical performance. The research employed a descriptive quantitative design using a physical fitness survey approach. The population consisted of all Grade X students at SMA Negeri 2 Jambi City, and the sample was determined using proportional random sampling. Data were collected in November 2024 through the Indonesian Physical Fitness Test (TKJI), which included the 60-meter sprint, flexed-arm hang, sit-up test, vertical jump, and 1000/1200-meter run to measure speed, muscular strength, muscular endurance, explosive power, and cardiovascular endurance. Data analysis was conducted using descriptive statistics in the form of percentages and standardized fitness category classifications. The results revealed substantial variation across all physical fitness components. Sprint performance ranged from 6.9 to 13.6 seconds, indicating marked differences in speed and neuromuscular coordination. Most students recorded 0 seconds in the flexed-arm hang test, reflecting low upper-body muscular strength. The sit-up and vertical jump tests showed wide disparities in abdominal endurance and lower-body explosive power. The greatest performance gap was observed in cardiovascular endurance, with 1000/1200-meter run completion times ranging from 3 minutes 48 seconds to 15 minutes 12 seconds. Overall, the majority of students were classified in the moderate physical fitness category. These findings indicate that although students demonstrate diverse fitness profiles, their overall physical fitness level still requires improvement, particularly in upper-body strength and cardiovascular endurance. The results highlight the importance of continuous physical activity engagement and structured fitness development through PJOK learning to support students' physical health, learning readiness, and long-term well-being.

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INTRODUCTION

Physical activity is widely recognized as a fundamental component of human life, originating from the concept of olah (movement) and raga (body), which emphasizes bodily movement as a means to maintain health, prevent disease, and enhance physical fitness. Regular and systematic physical activity contributes not only to physical well-being but also to mental health, personality development, and the formation of positive character values such as discipline, responsibility, and sportsmanship (Safitri et al., 2021). In the educational context, these benefits are primarily facilitated through Physical Education, Sports, and Health (PJOK), which plays a strategic role in shaping students' holistic development.

However, despite the recognized importance of PJOK, empirical evidence shows that students' physical fitness levels in secondary schools are often not optimally developed. Many students demonstrate low participation in physical activity, reduced endurance, and limited understanding of the importance of physical fitness for long-term health and academic performance (Lengkana & Mukhtar, 2021; Pritama et al., 2018). This condition is increasingly concerning in the era of sedentary lifestyles, where screen-based activities dominate students' daily routines and reduce opportunities for active movement.

Physical fitness is a crucial indicator of an individual's ability to perform daily activities efficiently without excessive fatigue. It reflects the functional capacity of the cardiovascular, muscular, and neuromuscular systems to support both academic learning and daily life demands (Bile & Suharjana, 2019). In school settings, particularly at the senior high school level, insufficient physical fitness may negatively affect students' engagement in PJOK learning, movement skill execution, and overall learning outcomes. Nevertheless, in many schools, physical fitness assessment is not conducted systematically, resulting in limited data to inform instructional planning and health promotion strategies.

Preliminary observations at SMA Negeri 2 Jambi City indicate that the physical fitness levels of Grade X students have not been clearly mapped or evaluated using standardized instruments. Students' participation in physical fitness activities during PJOK lessons is relatively low, and many students lack awareness of the long-term benefits of maintaining good physical fitness. This condition highlights the need for a structured and evidence-based assessment to identify students' physical fitness levels as a foundation for improving PJOK learning quality and student health outcomes.

Recent studies emphasize that physical education is not merely a medium for physical training but a comprehensive educational process that integrates cognitive, affective, and psychomotor domains (Morgan & Hansen, 2016; Li, 2016). Well-designed physical education programs have been shown to improve students' motor competence, learning motivation, and health-related fitness simultaneously (Bailey et al., 2019). In addition, physical fitness is increasingly viewed as a predictor of academic achievement, mental well-being, and lifelong healthy behavior (Donnelly et al., 2016).

In Indonesia, several studies have examined students' physical fitness levels in school settings using survey-based and test-based approaches. Research by Lengkana and Mukhtar (2021) revealed that junior and senior high school students generally exhibit moderate to low levels of physical fitness, particularly in endurance and muscular strength

components. Similarly, Irawan (2019) reported that variations in students' physical fitness are strongly influenced by physical activity frequency, lifestyle patterns, and the effectiveness of PJOK implementation. Studies indexed in SINTA also highlight that inadequate facilities, limited lesson duration, and low student motivation often hinder the achievement of optimal physical fitness outcomes in schools (Tapo & Bile, 2020).

At the international level, Scopus-indexed research consistently confirms the importance of regular fitness assessment in school-based physical education. Monitoring students' physical fitness provides valuable feedback for teachers to design appropriate learning strategies and health interventions (Castelli et al., 2014; Ortega et al., 2018). Moreover, school-based fitness surveys are increasingly recommended as preventive health measures to detect early risks of physical inactivity and related health problems among adolescents (WHO, 2020).

Although numerous studies have addressed physical fitness in school contexts, several gaps remain evident. First, many studies focus on intervention-based programs, while fewer emphasize descriptive surveys that provide a comprehensive baseline of students' physical fitness levels within specific school contexts. Second, existing research in Indonesia often concentrates on elementary or junior high school students, leaving senior high school populations underrepresented, particularly in regional contexts such as Jambi City.

Third, previous studies rarely link physical fitness survey results explicitly with PJOK learning implementation, even though PJOK serves as the primary institutional platform for developing students' physical fitness. As a result, empirical data that can directly inform PJOK instructional planning and policy decision-making at the school level remain limited. Furthermore, the lack of school-specific physical fitness profiling makes it difficult to identify contextual challenges, such as students' activity habits and participation barriers, that influence fitness outcomes.

These gaps indicate the need for a localized, school-based physical fitness survey that not only describes students' fitness levels but also provides a meaningful reference for improving PJOK learning quality and promoting active lifestyles among adolescents.

Based on the identified problems and research gaps, this study aims to survey and analyze the physical fitness levels of Grade X students at SMA Negeri 2 Jambi City through PJOK learning. Specifically, the study seeks to: (1) determine the overall physical fitness profile of students, (2) identify dominant and weak fitness components, and (3) provide empirical evidence to support the optimization of PJOK learning implementation.

The novelty of this study lies in its context-specific, PJOK-based physical fitness mapping at the senior high school level, which integrates fitness assessment as an evaluative and diagnostic tool rather than merely an outcome measure. By positioning physical fitness survey results as a foundation for instructional improvement and health promotion, this study contributes practically to PJOK pedagogy and theoretically to the growing body of school-based physical fitness research in Indonesia. The findings are expected to serve as a reference for teachers, schools, and policymakers in designing more effective, data-driven physical education programs that support students' physical health and overall development.

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METHODS

This study employed a physical fitness survey using a descriptive quantitative approach, rather than a program management design, as the primary objective was to describe and map students' physical fitness levels based on empirical measurement results. The research was conducted at SMA Negeri 2 Jambi City, with data collection carried out in November 2024. The descriptive survey design was chosen to systematically and factually portray the current condition of students' physical fitness without manipulating variables or implementing interventions, in accordance with the principles of descriptive research in physical education (Winarno, 2013).

The study focused on a single variable, namely students' physical fitness level, which reflects the functional capacity of the body to perform physical activities efficiently. The population consisted of all Grade X students at SMA Negeri 2 Jambi City, totaling 388 students distributed across 13 classes. To obtain representative data, the sample size was determined using the Slovin formula with a 90% confidence level, resulting in a sample of 80 students. The sampling technique applied was Proportionate Stratified Random Sampling, in which each class served as a stratum, and samples were randomly selected proportionally from each stratum to ensure balanced representation of the population (Sujarweni, 2015).

The instrument used to measure students' physical fitness was the Indonesian Physical Fitness Test (Tes Kebugaran Jasmani Indonesia/TKJI), which is a standardized national test developed specifically for Indonesian students. TKJI has been widely used in school-based physical fitness surveys and is recommended by physical education experts and institutions due to its suitability for the characteristics of Indonesian adolescents (Sepdanius et al., 2019). The TKJI consists of five test items administered sequentially: (1) a 60-meter sprint to measure speed, (2) body lift or flexed-arm hang to assess upper-body muscular strength and endurance (30 seconds for female students and 60 seconds for male students), (3) a 60-second sit-up test to measure abdominal muscular endurance, (4) a vertical jump test to assess lower-body explosive power, and (5) a long-distance run to evaluate cardiovascular endurance (1000 meters for female students and 1200 meters for male students)(Putra, 2022).

In terms of validity, TKJI demonstrates strong content validity, as the test items comprehensively represent the main components of physical fitness, including speed, muscular strength, muscular endurance, explosive power, and cardiorespiratory endurance. These components are consistent with internationally recognized physical fitness constructs for adolescents and align with the objectives of PJOK learning in Indonesia. Previous studies have confirmed that TKJI is appropriate for assessing students' physical fitness levels in school contexts and provides meaningful information related to students' physical performance capacity (Sepdanius et al., 2019; Lengkana & Mukhtar, 2021).

Regarding reliability, TKJI has been reported to have acceptable to high reliability coefficients when administered following standardized procedures. Test–retest reliability analyses conducted in prior studies indicate consistent results across repeated measurements, particularly for sprint, sit-up, vertical jump, and endurance run components, making TKJI a reliable instrument for large-scale physical fitness surveys in educational settings (Putra, 2022). To maintain measurement reliability in this study,

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all test procedures followed the official TKJI guidelines, test administrators were briefed in advance, and standardized equipment and instructions were used for all participants.

Data obtained from the TKJI were analyzed using descriptive statistical techniques, including mean scores, frequency distributions, and percentage classifications. Students' physical fitness levels were categorized into standardized fitness categories (very good, good, moderate, poor, and very poor) based on TKJI normative scoring criteria. This analysis aimed to provide a clear and systematic profile of students' physical fitness levels as a basis for evaluating PJOK learning outcomes and supporting school-based physical activity planning.

RESULTS AND DISCUSSION

Result

The results of the physical fitness measurements of Grade X students at SMA Negeri 2 Jambi City revealed significant variations across all components of the Indonesian Physical Fitness Test (TKJI), including the 60-meter sprint, flexed-arm hang, sit-up test, vertical jump, and the 1000/1200-meter run. Each test represents different components of physical fitness, namely speed, muscular strength, explosive power, and cardiovascular endurance. Overall, the distribution of students' physical fitness levels indicated that most students were classified in the moderate category, followed by the good and poor categories, while only a small proportion reached the very good category. These findings reflect that students' overall physical fitness level still requires improvement through well-managed and structured physical training programs.

Table 1.
Summary of Physical Fitness Measurement Results of Grade X Students at SMA Negeri 2 Jambi City

Test Component	Result Range	Performance Variation	Fitness Indicator	Key Findings	Training Recommendations
60 m Sprint	6.9 s – 13.6 s	Very wide	Speed	Large differences in speed and neuromuscular coordination	Interval sprints, agility drills, reaction training
Flexed-Arm Hang	0 s – several seconds	Many students scored 0	Upper-body muscular strength	Very low upper-body strength among students	Push-ups, pull-ups, resistance training
Sit-Up	Several – 40 repetitions	Moderate to high variation	Abdominal muscle endurance	Large disparities in core strength	Sit-ups, planks, core functional training
Vertical Jump	Up to 71 cm	Large variation	Lower-limb explosive power	Some students performed very well, many performed low	Plyometrics (box jumps, squat jumps)
1000/1200 m Run	3:48 – 15:12	Most extreme variation	Cardiovascular endurance	Very wide differences in aerobic capacity (VO_2 max)	Jogging, long-distance running, cycling, swimming
Fitness Category	"Very Good", "Good", "Moderate", "Poor"	Majority in "Moderate"	Overall physical fitness	Most students require improvement	Structured and continuous training programs

Source : Primary Data (2025)

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Discussion

The findings of this study reveal substantial variation in the physical fitness components of Grade X students at SMA Negeri 2 Jambi City, indicating uneven development across speed, muscular strength, endurance, explosive power, and cardiovascular capacity. This variation reflects not merely individual differences, but also broader patterns of physical activity engagement and fitness development among adolescents in school settings. The discussion therefore focuses on interpreting these fitness outcomes and their implications for students' physical health and learning capacity, rather than on program management aspects.

The results of the 60-meter sprint test demonstrated a wide performance gap, with the fastest time recorded at 6.9 seconds and the slowest at 13.6 seconds. Sprint performance is closely associated with neuromuscular coordination, reaction speed, and anaerobic power, which are fundamental components of physical fitness in adolescents (Bompa & Buzzichelli, 2019). Students who recorded slower sprint times may experience limitations in movement efficiency, agility, and overall physical responsiveness. Similar findings have been reported by Ortega et al. (2018), who emphasized that low speed performance in youth is often linked to insufficient exposure to high-intensity movement activities. The observed sprint disparities in this study suggest that speed-related physical conditioning among students remains underdeveloped and requires targeted physical activity exposure.

Upper-body muscular strength, as measured by the flexed-arm hang test, emerged as one of the weakest components of students' physical fitness. A considerable number of students recorded 0 seconds, indicating very low arm and shoulder strength. Upper-body strength plays a critical role in supporting daily functional movements and sport-specific skills, as well as maintaining postural stability (Faigenbaum et al., 2016). The dominance of zero scores suggests that many students rarely engage in strength-based activities that challenge upper-body musculature. This pattern aligns with findings from Lengkana and Mukhtar (2021), who reported that Indonesian secondary school students generally demonstrate low upper-body strength due to limited resistance-based physical activity. Such deficiencies may negatively affect students' capacity to perform various movement tasks during PJOK learning and extracurricular sports activities.

The sit-up test results revealed notable disparities in abdominal muscle endurance, with repetitions ranging from very low to as high as 40 repetitions. Core muscle endurance is essential for maintaining posture, balance, and movement efficiency, and it plays a key role in injury prevention (Behm et al., 2015). Students with low abdominal endurance may experience early fatigue during physical activity, which can reduce participation and performance quality. Research by Granacher et al. (2018) supports the notion that insufficient core endurance in adolescents is associated with decreased motor control and higher injury risk. The wide range of sit-up scores observed in this study indicates uneven core fitness development among students, reinforcing the need for consistent core-focused physical activity.

Lower-body explosive power, as assessed through the vertical jump test, also showed significant variation. While some students demonstrated excellent explosive strength with jump heights reaching 71 cm, many others achieved substantially lower scores. Explosive power is a key determinant of performance in activities involving

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jumping, sprinting, and rapid directional changes (Markovic & Mikulic, 2010). Students with limited explosive power may struggle in dynamic movement tasks commonly encountered in physical education and sports. International studies indicate that adolescents' explosive power is strongly influenced by habitual physical activity levels and exposure to plyometric-type movements (Moran et al., 2017). The findings of this study suggest that opportunities to develop lower-body explosive power may not be equally accessible or sufficiently emphasized among all students.

The endurance run test (1000/1200 meters) produced the most pronounced performance gap, with completion times ranging from 3 minutes 48 seconds to over 15 minutes. Cardiovascular endurance reflects the functional capacity of the heart, lungs, and circulatory system to sustain prolonged physical activity and is a central indicator of health-related fitness (WHO, 2020). Students with poor aerobic endurance may be at higher risk of fatigue, reduced physical performance, and long-term health issues. These findings are consistent with Donnelly et al. (2016), who highlighted declining aerobic fitness trends among adolescents due to reduced physical activity and increased sedentary behavior. The wide endurance gap observed in this study underscores disparities in students' aerobic capacity and habitual physical activity patterns.

When compared with previous research, the results of this study demonstrate a consistent trend. Nulrwansyah and Ratri Jullianti (2020) found that 86.96% of students at SMA Negeri 1 in South Sulawesi were categorized as having "moderate" fitness levels, which closely aligns with the overall fitness profile observed in this study. Similarly, Wahyuldi and Ilham Fajrin (2019) reported that 60% of students at Madrasah Aliyah Negeri Tolitoli fell into the moderate fitness category. These converging findings indicate that moderate physical fitness remains the dominant profile among Indonesian adolescents, suggesting that current physical activity engagement may be insufficient to achieve optimal fitness levels.

In contrast, Kardianto et al. (2020) reported higher fitness levels among students at SMA Negeri 1 Cariu, where all participants were categorized as "good" or "very good." This discrepancy highlights the influence of contextual factors such as students' physical activity habits, school sports culture, and extracurricular involvement on fitness outcomes. International evidence supports this interpretation, showing that adolescents who regularly engage in structured and unstructured physical activities tend to exhibit superior fitness profiles (Guthold et al., 2020). Therefore, differences in fitness levels across schools are likely shaped by variations in daily movement exposure rather than individual ability alone.

Overall, the findings of this study indicate that although students at SMA Negeri 2 Jambi City demonstrate diverse physical fitness profiles, the average fitness level remains within a range that requires improvement. Deficiencies are particularly evident in upper-body strength and cardiovascular endurance, which are essential components of health-related fitness. These results emphasize the importance of focusing on fitness outcomes as a foundation for enhancing students' physical well-being and learning readiness. Improving students' physical fitness is not only relevant for sports performance but also for supporting academic engagement, mental health, and long-term healthy lifestyle development (Bailey et al., 2019).

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In summary, this discussion reinforces the conclusion that students' physical fitness levels require systematic attention through sustained physical activity engagement. By focusing on the interpretation of fitness outcomes rather than program management, this study contributes empirical evidence on adolescents' fitness profiles and highlights the need for continuous efforts to enhance speed, strength, endurance, and explosive power among senior high school students.

CONCLUSION

Based on the results of this study, it can be concluded that the physical fitness level of Grade X students at SMA Negeri 2 Jambi City shows considerable variation across all components of physical fitness, including speed, muscular strength, abdominal endurance, lower-body explosive power, and cardiovascular endurance. However, the overall level of students' physical fitness is still predominantly classified in the moderate category, indicating that their physical condition has not yet reached an optimal level. The findings also reveal that several components, particularly upper-body strength and cardiovascular endurance, remain relatively low among many students.

This condition highlights the importance of implementing well-managed, structured, and continuous physical fitness programs through Physical Education, Sports, and Health (PJOK) learning. Effective management of physical fitness programs that emphasize balanced training in strength, speed, endurance, and explosive power is essential to improve students' physical fitness levels. With the support of systematic training programs and consistent student participation, it is expected that students' physical fitness will improve significantly, which in turn can enhance their learning performance, health quality, and overall well-being

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