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Self-confidence as a mediator between physical fitness and academic achievement: A review of the literature

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Abstract: The primary aim of this literature review was to analyze the influence of physical fitness and self-confidence on adolescent academic achievement through several pathways, including improved cognition, focus, and memory. This literature review was conducted using the Preferred Reporting Items for Systematic Literature Reviews (SLR) guidelines. The search continued to PUBMED and Google Scholar through the Publish or Perish (PoP) application. Once the analysis was completed, 41 articles met the requirements. Research shows that there is a positive relationship between physical activity levels (especially moderate to strenuous physical activity) and fitness components (such as muscle strength, speed-agility, and cardiorespiratory fitness) with self-esteem and interpersonal relationships in adolescents. The research used was a correlational design, which involved observing a group of participants at a single point in time. The findings of this literature review are that physical fitness and self-confidence have a positive influence on adolescents' academic achievement. Practical implications include improving fitness programs in schools, which involve sports and physical exercise to support adolescents' physical and academic well-being, focusing on boosting confidence and supporting academic achievement. More research is needed to understand other factors such as sleep, diet, and stress management that affect academic performance with the right policies.

Keywords: *Academic achievement, Physical fitness, Self-confidence.*

1. Introduction

Providing green space to exercise regularly is one of the many programs that support exercise. All stages of life, from children to adults, and from intellectuals to laymen, require exercise. Although many physical fitness institutions from the government and private sectors are building parks in every city, it is not enough to make people more active and healthier. Physical fitness is the ability to carry out daily physical activities efficiently and without experiencing excessive fatigue [1]. These components include cardiovascular fitness, skeletal muscular strength, endurance, flexibility, agility, and balance. The goal of physical fitness is to achieve the expected degree of physical health and fitness and to increase productivity. Physical fitness is one of the measures of body quality and is essential for completing activities well and passionately. Some researchers who argue that the body's ability to perform daily activities without getting tired is called physical fitness.

A variety of very different processes occur during adolescence, which determine the development of a person's personality. Teens are very curious, challenging, and often brave to take risks without considering them. A number of scientific studies show that exercise is very important for children's growth. According to the National Sport Development Index (SDI) data in 2023 [2] the fitness level of Indonesian children and adolescents is very low. In the age group of 10-15 years, the level of good physical fitness is only 6.79%, while the level of physical fitness is lacking and lacking is 77.12%. In the age group of 16-30 years, the level of good physical fitness was only 5.04%, while the level of physical

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fitness was less and less at 83.53%. The data shows a decrease of 0.0008 points from SDI's achievements from 2022 to 2023. Other studies show that children and adolescents rarely spend time physically. However, nowadays, children are more often "communicating" with gadgets or computers to play games, which eventually leads to addiction, which not only reduces physical activity but also interferes with brain function and performance and negatively affects mental health [3, 4]. In-depth studies have looked at how physical fitness and academic achievement of school-age children correlate. The mechanism underlying how physical fitness levels affect academic achievement is still unknown, although many studies have shown that there is a positive correlation between these components.

Exercise and physical activity can increase blood flow to the brain, which results in more neural connections in the brain. This has an impact on students' behavior and cognitive function. Many studies have found that physical fitness is not directly correlated with students' academic achievement. Found that, self-confidence can improve students' ability to accept and overcome mistakes while learning and improve their achievements. This means that the influence of academic success is reviewed from factors that further affect the physical fitness condition of students, namely self-confidence.

Teens who lack confidence may not take full advantage of the benefits of physical fitness. Confident students tend to be more engaged, persistent, and motivated to complete schoolwork, which can lead to better academic outcomes. Academic outcomes are related to physical fitness, which includes muscle strength, cardiac endurance, and motor skills. a number of recent studies have consistently shown that, Self-confidence, a psychological concept that has been linked to physical fitness and academic achievement, may play an important role in the relationship between physical activity and good cognitive function, such as improved executive ability, increased attention, and brain development [5, 6]. Therefore, improving students' fitness will not only benefit their overall health, but it will also positively impact their academic performance.

Therefore, we believe that our finding expands the literature by showing that this literature review can collect, assess and explain various relevant studies on the interaction of physical fitness that have an impact on academic achievement, taking into account the confidence factor. This literature is also expected to be able to analyze the results of various studies to determine general patterns, similarities, and differences in findings regarding the influence of physical fitness on academic achievement and the role of self-confidence in this relationship.

2. Method

This research follows a systematic review methodology through which studies are searched for, evaluated, and synthesized, following a step-by-step, rigorous, transparent, and replicable procedure to ensure the reliability of the findings [7]. A systematic review of international literature was conducted using the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) 2020 [8]. This format allows us to conduct a thorough and comprehensive collection and analysis of the literature, exploring current knowledge and offering recommendations that may be useful for practice and future research [7].

Three Internationally renowned databases were used to search for empirical studies between 2015 and 2024: Pubmed, Scopus and Web of Science (general). All database searches were limited to English language peer-reviewed articles. Identification, screening, eligibility and included available research are the methods used to apply this method. Researchers examine articles that are relevant to the research questions. Each process is carried out in a structured and systematic manner by following predetermined stages.

After comprehensive keyword definitions, inclusion and exclusion search criteria were outlined and applied through database filters. Inclusion criteria include: (a) research between 2015-2024 related to the impact of physical fitness on the self-confidence and academic achievement of students aged 16-18 years. (b) the research involved specific physical activities (e.g., structured exercise, daily physical activity, or physical fitness programs) that were relevant to their impact on self-confidence and academic achievement using standardized indicators;

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The exclusion criteria do not include: (a) research that measures physical fitness on self-confidence and academic achievement of students under 16 years of age; (b) studies published before 2015; and (c) publications that have different contexts such as medication, non-empirical studies, non-English language and irrelevant populations.

Based on the above inclusion and exclusion criteria, 4,110 studies were identified. After that, the researcher carried out re-screening through selection stages one by one of the material contained in the article. Final selection was carried out through the procedures specified in PRISMA 2020 [8].

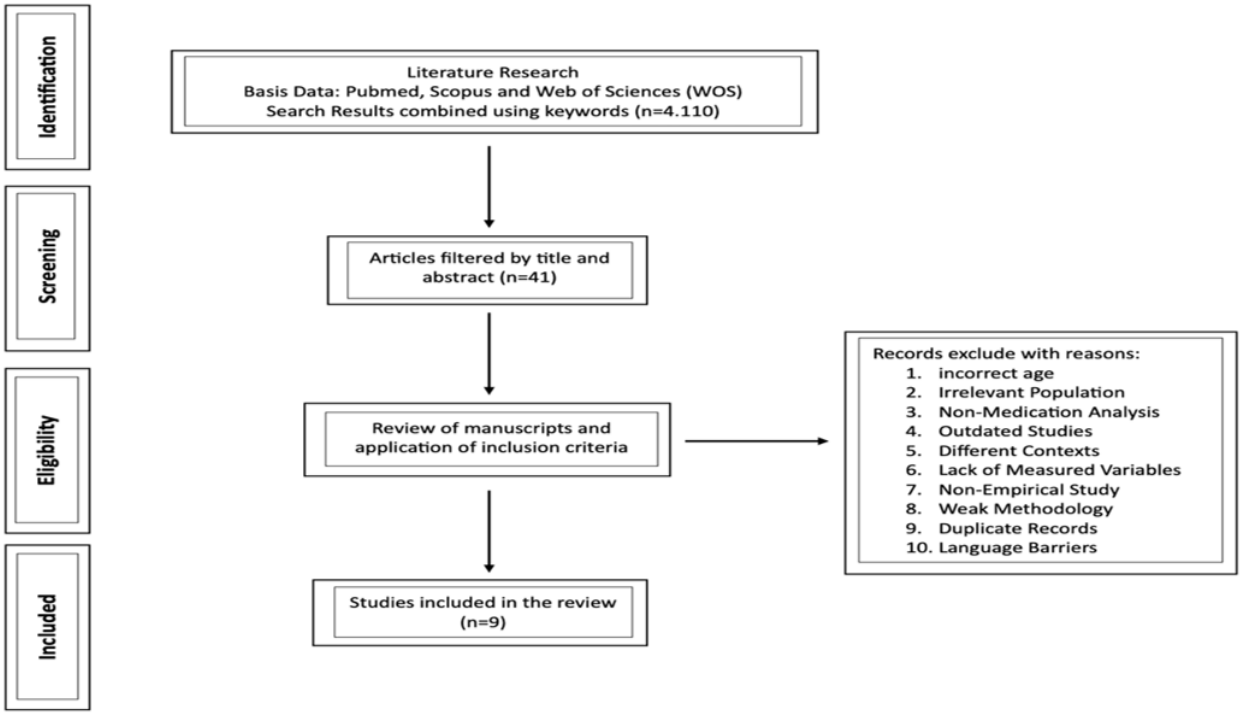

Figure 1.
PRISMA flowchart of the article selection process.

After the analysis was completed, there were 41 articles that met the requirements. Apart from various articles, there are 9 articles that are worthy of being studied, analyzed and studied thoroughly because they are relevant to the research theme and in accordance with the research objectives. The following is a chart of the stages that researchers carried out in carrying out this research Systematic Literature Review (SLR) by PoP.

3. Results

The results of the research data included in this literature review are an analysis and summary of articles related to physical fitness and its impact on confidence and academic achievement. In the literature review, there were 9 selected literatures to analyze the influence of physical fitness on adolescent confidence and academic achievement. It can be seen in the table below.

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Table 1.
Review of Research Results.

Author	Study Design	Subject	Result	Findings
Aqil and Fatima [9]	This study uses a comparative descriptive design. It can also be considered a cross-sectional study, with data collected at one point in time from different samples.	The study involved 1000 adolescents aged 17 to 19 years, consisting of 361 males and 639 females, with 671 of those living in urban areas and 329 of those living in rural areas.	It was found that there was a positive correlation between self-confidence and academic achievement. This suggests that increased self-confidence is associated with improved adolescent academic achievement.	The findings show that adolescents' self-confidence increases along with academic achievement. However, this relationship is considered a very small positive relationship (an unpredictable positive relationship). This suggests that self-confidence can serve as a mediating variable that affects adolescent academic achievement.
Yuda, et al. [10]	This study uses a correlational method.	The sample of this study consisted of 90 students at Ibtidaiyah Junior High School who were in grades 7 to 9.	There was a significant positive correlation between self-confidence, academic stress, and coping strategies and academic achievement. The regression coefficient showed that coping strategies had the greatest influence on academic achievement, followed by confidence and academic stress.	During the COVID-19 pandemic, self-confidence has proven to be an important predictor of students' academic achievement in physical education classes. Students who are more confident tend to achieve better academic results. Academic outcomes are also affected by academic pressure. Academic stress can get some students excited, but stress can hinder their performance.
Ortega-Gómez, et al. [11]	Although the study is designed to last around the clock, the analysis presented here focuses on cross-sectional baseline data collected between February and May 2015.	The sample used consisted of 268 14-year-old high school students. They consisted of 138 men and 130 women.	The study found that there was a positive association between physical activity levels (especially moderate to vigorous physical activity) and physical fitness components (such as lower muscle strength and cardiovascular fitness) and confidence and interpersonal relationships in adolescents	The study showed that physical fitness elements such as muscle strength, speed-agility, and cardiorespiratory fitness correlated with higher levels of self-confidence in adolescents.
Batez, et al. [6]	Using a longitudinal design, the study observed students for three years.	The sample used in this study consisted of 1,286 students between the ages of 11 and 14 years.	In general, children's academic achievement is positively related to physical fitness and motor competence. The study also noted that weight status (BMI) was negatively correlated with GPA scores, suggesting that children with higher BMIs tended to have lower academic achievement.	Studies show that there is a positive correlation between physical fitness levels and academic achievement. In particular, children with better fitness test results tend to have higher GPAs. This suggests that exercising can help with learning. Cognitive processing, overall health, and desire can control this relationship. In other words, there is a positive, significant, and complicated relationship between physical

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				fitness and academic achievement.
Han [12]	The research design used is a correlational design,	The research sample consisted of 236 students aged 13-15 who were randomly selected from three high schools in the city of D, South Korea.	Pearson's correlation test revealed a significant negative relationship between PAPS scores and final exam scores. This shows that students with higher levels of physical fitness tend to achieve better academic outcomes	There is a significant correlation between their level of physical fitness and their academic achievement. The results showed that healthier students tended to have better grades on final exams, especially in basic subjects such as math, English, and science.
Vist Hagen, et al. [13]	In a cross-sectional design, data is collected from a representative sample at a single point in time	To ensure variation in the data, the study sample consisted of high school students who were 13–16 years old. Participants were selected from various schools.	Research shows that physical fitness has a greater influence on academic achievement in PE compared to motor competence	In physical education (PE), there is a significant relationship between fitness and academic achievement. Students who are fitter tend to have better PE scores than students who are less fit. This study emphasizes how important physical fitness is as a factor that can affect academic achievement, and suggests that physical fitness teachers consider everyone's physical fitness level when assessing and teaching.
Gil-Espinosa, et al. [14]	This study uses a data collection method conducted during the first semester of the 2015/2016 school year.	The sample used was a comfort sample consisting of 403 adolescents (53.6% males) with an average age of 13.7 ± 1.2 years from a secondary school in Andalusia, Spain	Research shows that there is a positive association between physical fitness components, especially cardiovascular fitness, and academic achievement. Teens who have higher levels of physical fitness tend to have better academic performance	The study found that general intelligence and cardiac fitness in adolescents were positively correlated. It shows a link between cardiovascular fitness levels and better cognitive performance as measured through intelligence tests. This means that teenagers who are physically fit are more likely to achieve academic achievements. You can improve your fitness by exercising regularly, which can have a positive impact on your intelligence and academic performance.
Sardinha, et al. [15]	This longitudinal design allows researchers to evaluate the long-term relationship between physical fitness and academic achievement among students.	The study involved 1,286 students from 14 schools, with an age range between 11 and 14 years old.	Research has found that students who have good levels of cardiovascular fitness tend to have better academic achievement. Students who were categorized as "unfit" at the start of the study but improved their fitness status during the follow-up period showed improvements in academic achievement compared to students	Students who are more fit from not being fit to being fit also show better academic performance. This shows that not only is consistent fitness important, but better fitness can also have a positive impact on academic achievement.

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			who remained "unfit"	
Li, et al. [16]	The study used a cross-sectional design, which involved observing a group of participants at a single point in time	A total of 304 eighth-graders aged 13-14 from seven public schools in Tekirdag, Turkey, were recruited. Schools are selected based on similar socioeconomic backgrounds.	The study found significant differences in VO2max scores across academic achievement groups, with the poor performing group showing a higher VO2max than the average group and the good group (47.1 vs 42.6 and 42.4, respectively)	The study shows that students with poor academic performance can engage more in physical activity, potentially at the expense of their studies. These findings challenge conventional understandings of the relationship between physical fitness and academic success.

4. Discussion

The main objective of this literature review is to analyze the influence of physical fitness and confidence on adolescent academic achievement. Various studies show that physical fitness has a positive impact on students' academic achievement. Research shows that physical fitness affects a person's academic and health outcomes [15]. Other studies by Gil-Espinosa, et al. [14] showed a positive association between cardiorespiratory fitness and flexibility and academic achievement, while muscle strength did not show a significant association with achievement in certain subjects.

Regular physical activity not only contributes to improved physical fitness, but also has a significant influence on learners' cognition, focus, and memory. Elmazi, et al. [17] emphasizes the important role of moderate to vigorous physical activity in improving cognitive function and academic success among adolescents. It highlights the need to adhere to established guidelines for physical activity, sleep, and screen time to promote better educational outcomes and overall well-being. This means that students who engage in physical activity can improve their memory, concentration, and focus. Studies show that students who are physically active tend to have better grades than their less active peers [18]. So, children are also more likely to have better health, and they are less likely to miss school. There was also evidence that aerobic activity, an 11-week physical exercise intervention had a significant effect on children's executive function (EF) parameters, including inhibition control, working memory, reaction time, and cognitive flexibility [19]. This is in line with Erickson, et al. [20] which states that the release of hormones that support cognitive function and increase blood flow to the brain so that exercising regularly can improve sleep quality, which helps memory and learning.

The relationship between physical fitness and academic achievement is increasingly being discussed, especially in the context of self-confidence. Overall, fitness and confidence are intertwined and can influence each other. Improving physical fitness can be a positive step to increase self-confidence, and conversely, high self-confidence can encourage individuals to be more active in maintaining their fitness. Through activities that involve physical activity that is actively and regularly carried out can increase students' confidence and tend to feel better about their appearance [10]. The reason is that involvement in physical activity often involves social interaction, which can increase self-confidence.

High self-confidence is often positively associated with academic achievement. Arenas, et al. [21] explains that self-confidence encourages students to be more involved in the learning process and have higher motivation. In addition, good mental health contributes to better academic outcomes, with positive education that can improve mental health and create a more supportive learning environment. Confident students tend to be more courageous to face difficult tasks and actively participate in class discussions and extracurricular activities. Self-confidence can help students better manage academic pressure. Therefore, by supporting physical activity, schools can help students not only in physical health, but also in their academic achievement. Research proves that students who have high confidence tend to be more motivated to learn and participate in academic activities [9]. Self-confidence helps students in facing academic challenges, increasing their resilience to stress and pressure. The positive interactions that physical fitness engenders can improve mood and reduce anxiety, which contributes to

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increased self-confidence [22]. Therefore, when students feel better emotionally and are better able to cope with stress, they tend to have a more positive view of themselves and their abilities so they are more likely to show good academic performance.

5. Conclusions

Overall, this review of the literature shows that physical fitness has a significant impact on adolescents' academic achievement through several pathways, including improved cognition, focus, and memory. Regular physical activity also increases students' self-confidence, which in turn can affect learning motivation and participation in academic activities. Therefore, physical activity support in schools can help students not only in physical health but also in their academic achievement.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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