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The Relationship Between Lesson Planning and Exercise Intensity to Improvements in Students' Physical Fitness.

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ABSTRACT

Introduction. Physical fitness is a key health indicator for students, yet the pedagogical and physiological determinants of fitness gains in Physical Education (PE) are rarely examined together. This review synthesises evidence on how lesson planning and exercise intensity relate to improvements in students' physical fitness. **Methods.** A narrative literature review was conducted using Google Scholar. Eight studies published between 2019 and 2026 that met the eligibility criteria were analysed thematically. **Results.** Studies of lesson planning and learning design consistently linked well-structured, varied, and enjoyable lessons to higher student engagement and participation. Studies of exercise intensity indicated that regular moderate-to-high intensity activity, such as circuit training and aerobic exercise at 60–80% of maximum heart rate, was associated with better endurance and cardiorespiratory capacity, whereas insufficient duration or quality weakened this association. None of the included studies examined both variables simultaneously. **Conclusion.** Lesson planning appears to be an upstream condition that determines whether adequate exercise intensity is delivered, engaged in, and sustained. Fitness improvement is therefore best supported by planning that deliberately builds in intensity, progression, and monitoring. Because the available evidence is largely descriptive and associative, studies that measure both variables and test causal effects are needed.

1. Introduction

The role of the educator in the Physical Education (PE) learning process on the field is crucial for achieving the desired outcomes. An educator's responsibility extends beyond merely conveying information; it encompasses providing guidance, direction, and motivation to ensure students actively participate in every learning activity. With proper guidance, students can grasp the importance of exercise and maintaining good health, while also improving their physical abilities and teamwork skills. Furthermore, Physical Education educators must design teaching strategies that are creative, engaging, and tailored to students' needs. Incorporating various games, exercises, and teaching aids can boost student motivation and facilitate a better understanding of the material. Through an enjoyable learning approach, the objectives of Physical Education can be effectively met, fostering students who are more active, disciplined, and self-confident.

Physical fitness is crucial in Physical Education (PE) because it is directly linked to students' ability to perform daily activities without easily becoming fatigued. Students with good physical fitness tend to be more energetic and healthy, allowing them to participate more optimally in the learning process.

Conversely, poor physical fitness can cause students to tire quickly, lack enthusiasm, and experience reduced concentration while studying. Efforts to improve students' physical fitness are influenced by various factors, such as diet, lifestyle, physical activity, the school environment, and the PE teaching methods employed by the teacher. In this regard, PE teachers play a vital role in creating an active, effective, and enjoyable learning atmosphere that motivates students to participate in learning activities (Setiawan, 2013).

One of the key elements for successful Physical Education (PE) instruction is lesson planning. This process involves the systematic determination of objectives, content, methods, tools, and evaluation procedures. An instructor with a well-structured lesson plan finds it easier to manage the class and select activities suited to students' abilities. A sound plan also assists the teacher in selecting appropriate exercises to ensure optimal learning outcomes.

Exercises with an appropriate level of difficulty can improve students' cardiorespiratory endurance, strengthen muscles, enhance flexibility, and refine movement coordination. Conversely, if exercises are performed at a very low intensity, the results will not be impactful enough to improve physical fitness. On the other hand, if the exercise intensity is too high, it can lead to exhaustion or even injury. Physical education teachers must recognize the importance of properly calibrating exercise levels during instruction. Implementing various exercise methods-such as games, circuit training, group activities, and movement-focused instruction-can foster greater student engagement in the learning process. In this way, the learning process not only enhances motor skills but also improves overall physical health.

Globally, insufficient physical activity among school-aged children and adolescents remains a public-health concern, and the World Health Organization recommends an average of at least 60 minutes of moderate-to-vigorous physical activity per day for this age group (Bull et al., 2020). Physical fitness, particularly cardiorespiratory fitness, is regarded as a powerful marker of current and future health in youth (Ortega et al., 2008). Because PE reaches nearly all students in a structured way, it is a strategic setting in which fitness can be developed. Evidence on training intensity points in the same direction: a meta-analysis of school-aged adolescents found that high-intensity interval training produced large improvements in cardiorespiratory fitness (Costigan et al., 2015), which suggests that the intensity of the activity students actually perform matters, not only how much time they spend active.

Despite this, the literature that is accessible to Indonesian PE teachers tends to treat lesson planning and exercise intensity separately. Studies of lesson planning focus mainly on teacher readiness, student engagement, and participation (Pambudi et al., 2019; Mashuri, 2019), whereas studies of exercise intensity and training methods focus on fitness outcomes (Milliandika et al., 2023; Sukron & Firjatulloh, 2025). Planning is the stage at which teachers decide the content, duration, sequence, and difficulty of activities, and therefore the intensity that students can realistically reach in a lesson, yet few syntheses have examined how these two elements relate to each other and to fitness. This unresolved link between the pedagogical decision (planning) and the physiological stimulus (intensity) is the gap addressed by the present review.

Previous studies indicate that effective lesson planning and consistent, appropriate exercise have a positive impact on students' physical fitness. Well-designed lessons can encourage students to engage more actively in physical activities, which benefits their health and physical condition. Therefore, this study aims to synthesise the literature on the relationship between lesson planning and exercise intensity in improving students' physical fitness in PE, and to identify what is and is not yet known about how the two interact. The review is expected to provide insights into the importance of effective instructional management in Physical Education (PE) for improving students' physical fitness.

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2. Methods

This study employs a narrative literature review, a research approach that collects, analyses, and synthesises existing studies on a topic to identify patterns, relationships, and gaps (Snyder, 2019). To make the procedure transparent, the search, screening, and selection steps are reported following the principles of the PRISMA 2020 statement as far as they apply to a narrative review (Page et al., 2021).

Search strategy. Literature was searched in Google Scholar using combinations of Indonesian and English keywords: "perencanaan pembelajaran" / "lesson planning", "intensitas latihan" / "exercise intensity", "kebugaran jasmani" / "physical fitness", "pendidikan jasmani" / "physical education", and "circuit training". Keywords were combined with the Boolean operators AND and OR. The search covered publications from 2019 to 2026.

Eligibility criteria. Studies were included if they (a) were published between 2019 and 2026 in a journal; (b) involved school students (junior high, senior high, or vocational) or PE instruction; (c) addressed lesson planning or learning design, exercise intensity or training method, and/or students' physical fitness; and (d) were available in full text in Indonesian or English. Studies were excluded if they were duplicates, did not concern a school or PE context, did not report findings relevant to physical fitness, or were opinion pieces without data.

Data extraction and analysis. For each study, the title, authors and year, research method, and main findings were extracted into Table 1. The findings were then analysed using content analysis and organised into three themes: (1) lesson planning in PE, (2) exercise intensity and physical fitness, and (3) the relationship between lesson planning and exercise intensity. No formal risk-of-bias tool was applied, which is acknowledged as a limitation of this review.

3. Results

The following are the results of a literature review analyzing several articles and studies concerning lesson planning, training intensity, and the improvement of students' physical fitness.

No	Article Title	Research Methods	Research Findings
1	Physical Education Lesson Planning and Student Physical Fitness (Pambudi et al., 2019).	Descriptive	Research reveals that a well-designed lesson planning system can enhance student engagement in Physical Education (PE) lessons. Instructors who effectively formulate learning objectives, methods, and activities can boost student participation in physical activities, ultimately leading to improved physical fitness.
2	Analysis of the physical fitness level of students at Muhammadiyah 1 Sukoharjo Secondary School (Januarianto & Warthadi, 2023).	Descriptive quantitative (survey)	Most students were in the "fair" (46%) and "low" (44%) fitness categories, while 3% were "good", 7% "very low", and none "very good". The authors recommend increasing physical activity and implementing more structured training programmes.
3	Physical activity-based Physical Education instruction (Abdalah et al., 2026).	Literature Study	Physical education (PE) instruction based on physical activity contributes to the development of students' social skills and character. Group-based physical activities in PE foster cooperation, sportsmanship, and discipline—qualities observed to improve

No	Article Title	Research Methods	Research Findings
			significantly among students participating in active PE programs compared to those in conventional classes.
4	The effect of circuit training on the physical fitness of SMP Negeri 2 Mataram students (Sukron & Firjatulloh, 2025).	Quasi-experiment	Circuit training offers a flexible, practical, and enjoyable teaching method for physical education. PE instructors are encouraged to integrate this approach into their lessons, whether as a routine activity or as part of a student fitness enhancement program. It is hoped that the long-term outcomes of this training will not only boost physical fitness but also instill active and healthy lifestyle habits in students from their school years onwards.
5	Analysis of Physical Activity and Nutritional Status on Physical Fitness in Junior High School Students: A Literature Review (Putro & Winarno, 2022).	Literature review	Physical activity and nutritional status were both found to be related to physical fitness. Some of the reviewed studies reported a weak or non-significant relationship between physical activity and fitness, which was attributed to other influencing factors such as age, gender, and genetics, and to activity of limited duration or quality.
6	Analysis of Physical Fitness and Exercise Intensity Aspects among Junior High School Students (Milliandika et al., 2023)	Descriptive quantitative	Aerobic exercise performed at an intensity of 60–80% of maximum heart rate has been shown to significantly improve students' cardiorespiratory capacity. Setting the appropriate intensity for this type of exercise supports enhanced heart and lung function while reducing the risk of excessive fatigue.
7	Analysis of the enjoyment level of physical activity among vocational high school physical education students (Mashuri, 2019).	Qualitative Descriptive	PE teachers play a pivotal role in designing dynamic, innovative, and enjoyable lessons. Students tend to be more enthusiastic and motivated to participate when the activities are varied and engaging rather than monotonous, which supports their physical fitness.
8	Development of a traditional game-based physical fitness training model as a student learning activity in physical education (Bile et al., 2021).	Research and development (R&D)	A traditional-game-based fitness training model (Play4Fit) was developed and judged appropriate (feasible) as a student learning activity in PE. Traditional games were proposed as an alternative to monotonous fitness exercises, boosting students' motivation, cooperation, and participation.

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Table 1 summarises the eight included studies. Three groups can be distinguished. Four studies addressed lesson planning or learning design and student engagement (Pambudi et al., 2019; Mashuri, 2019; Bile et al., 2021; Abdalah et al., 2026). Two examined exercise intensity or a specific training method in relation to fitness (Milliandika et al., 2023; Sukron & Firjatulloh, 2025). Two described students' fitness levels and the factors associated with them (Januarianto & Warthadi, 2023; Putro & Winarno, 2022).

The designs were heterogeneous (descriptive, quasi-experimental, research and development, and literature review), and all included studies were conducted in Indonesian school contexts. Only one study used a quasi-experimental design, and none of the eight studies reported examining lesson planning and exercise intensity together within a single design.

4. Discussion

Physical Education (PJOK) instruction plays a vital role in enhancing students' health and physical fitness. During the learning process, educators are responsible not only for imparting information but also for creating an active, engaging learning environment tailored to the students' characteristics. Consequently, instructional planning and the determination of exercise intensity levels are two key aspects that require attention in Physical Education. A review of existing research indicates that effective instructional planning positively impacts improvements in students' physical fitness. A study by Pambudi et al. (2019) revealed that systematically designed lesson plans can boost student engagement and active participation in Physical Education activities. Teachers who effectively establish learning objectives, methods, and activities foster greater student involvement in physical activities, thereby contributing to improved physical fitness.

1. Instructional planning in Physical Education (PJOK)

   Lesson planning is a crucial aspect influencing the success of Physical Education(PE) instruction. A PJOK educator must be able to structure lessons systematically to ensure the learning process proceeds smoothly, follows a clear direction, and aligns with desired objectives. This planning encompasses defining learning goals, selecting content, choosing teaching methods and media, and determining how to assess student learning outcomes. In PJOK, an effective plan helps teachers manage students' physical activities more optimally. Teachers can select appropriate types of exercises, schedule sessions, introduce activity variations, and adjust difficulty levels to match students' abilities.

   Mashuri (2019) emphasises that PJOK teachers play a pivotal role in designing dynamic, innovative, and enjoyable learning experiences. Teachers who manage the learning process well can raise students' motivation to participate actively, which in turn supports physical fitness. Students tend to be more enthusiastic when the activities provided are varied and engaging rather than monotonous. Together with Pambudi et al. (2019), these findings suggest that instructional success depends heavily on teachers' readiness to prepare well-structured lesson plans.

   Research by Abdalah et al. (2026) reveals that PJOK instruction prioritizing physical activity not only improves physical health but also fosters the development of students' social skills and character. Group-based physical activities in PJOK can strengthen cooperation, sportsmanship, and discipline among students. This demonstrates that well-structured instruction yields benefits in both physical and social domains.

This view is reinforced by research conducted by Bile et al. (2021), which demonstrates that incorporating traditional games into instruction can boost students' motivation, cooperation, and participation in physical activities. Presenting the material through games fosters greater student enthusiasm, leading to a gradual and sustained improvement in physical fitness. Engaging instruction has been shown to increase student participation levels in Physical Education and Sports activities.

Based on these research findings, it can be concluded that lesson planning that is organized, innovative, and enjoyable is associated with greater students' motivation, engagement, and physical health. Physical Education teachers need to design learning activities that align with students' needs to ensure the learning process is effective.

2. Exercise Intensity and Physical Fitness

Exercise intensity is a measure of the strenuousness or lightness of a physical activity performed during training. This factor is crucial for improving physical fitness, as it relates to the body's ability to handle the training load. In the context of Physical Education (PJOK) instruction, exercise intensity must be tailored to the students' age, physical condition, and capabilities.

Research by Januarianto and Warthadi (2023) revealed that the physical fitness of students at SMK Muhammadiyah 1 Sukoharjo was categorized as "fair." Nearly half of the students (46%) fell into the "fair" category, while 44% were in the "low" category, 3% in the "good" category, and 7% in the "very low" category. No students fell into the "very good" category. These findings indicate a need to improve student physical fitness through increased physical activity and the implementation of more structured training programs.

Sukron and Firjatulloh (2025) reported that circuit training is an adaptable, practical, and enjoyable method for PE. Because circuit training combines varied exercises performed repeatedly at set intensities, it is a convenient way to deliver a planned intensity in a school lesson, and it may also help foster healthy and active lifestyle habits among students. As a quasi-experimental study, however, it provides stronger evidence of effect than the descriptive studies discussed above.

A study by Milliandika et al. (2023) revealed that aerobic exercise performed at an intensity of 60% to 80% of the maximum heart rate improves students' cardiorespiratory capacity. Adjusting exercise intensity appropriately plays a role in enhancing heart and lung function while reducing the risk of excessive fatigue. This indicates that engaging in moderate-to-high-intensity exercise positively influences improvements in student physical fitness.

However, the literature review by Putro and Winarno (2022) showed that the relationship between physical activity and physical fitness is not always significant in the studies it covered. Where weak relationships were reported, they were attributed to other influencing factors, such as age, gender, genetics, and nutritional status, and to activity of limited duration or quality. Taken together with Milliandika et al. (2023), these findings suggest that intensity matters, but mainly when it is accompanied by sufficient regularity and quality.

3. The Relationship Between Lesson Planning and Training Intensity

Lesson planning and exercise intensity both contribute to improving students' physical fitness, and the reviewed studies suggest that they are linked. Through lesson planning, teachers determine learning objectives, types of physical activity, exercise frequency and duration, and the intensity levels appropriate for students. Pambudi et al. (2019) show that well-designed lessons can make students more active and interested in participating in physical activities, and students

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who are actively engaged have a greater chance of improving their physical fitness. Studies by Sukron and Firjatulloh (2025) and Milliandika et al. (2023) indicate that appropriate training methods, such as circuit training and aerobic exercise at 60–80% of maximum heart rate, are associated with better fitness outcomes. Properly adjusting exercise difficulty allows students to benefit from the activity without becoming overly exhausted.

Furthermore, Mashuri (2019) and Bile et al. (2021) found that diverse, engaging, and enjoyable teaching methods can enhance students' motivation to be physically active, and lessons structured as games generate greater enthusiasm for physical activity. Abdalah et al. (2026) also noted that PE lessons focused on physical activity can improve students' social skills, cooperation, discipline, and character. Effective PE lesson planning therefore contributes not only to physical health but also to students' social and psychological development.

4. Critical Synthesis: How Planning and Intensity Jointly Shape Fitness

Read together, the reviewed studies suggest a plausible but still untested pathway. Lesson planning is an upstream condition: it determines the activities selected, the time students actually spend moving, how difficulty progresses, and therefore the intensity that can be reached in a lesson. Exercise intensity is the proximal physiological stimulus, and fitness improves when that stimulus is sufficient, repeated regularly, and adjusted to students' capabilities (Costigan et al., 2015; Milliandika et al., 2023). Student engagement and motivation, which the planning studies emphasise (Pambudi et al., 2019; Mashuri, 2019), appear to link the two, because students must be willing to work at the intended intensity.

This pathway also reveals a tension that the individual studies do not address. Game-based and traditional-game approaches are repeatedly shown to raise enthusiasm and participation (Mashuri, 2019; Bile et al., 2021), but an enjoyable activity is not necessarily an intense one, and none of these studies quantified the intensity that students actually reached. Conversely, the intensity studies specify heart-rate targets or training protocols (Milliandika et al., 2023; Sukron & Firjatulloh, 2025) but say little about how teachers should embed them in everyday lesson plans. Lesson plans that state target intensity (for example, a heart-rate zone or a perceived-exertion range), include progression across meetings, and monitor students' response would address both limitations. The findings of Putro and Winarno (2022) are a reminder that duration, quality, and individual factors such as age, gender, and nutritional status moderate any effect.

Several limitations of the evidence should be considered when interpreting these conclusions. First, most included studies are descriptive or associative, so the relationships described should not be read as causal. Second, the studies are heterogeneous in design, population, and outcome measures, and all come from Indonesian school settings, which limits generalisability. Third, no included study measured lesson planning quality and exercise intensity together, so their joint effect remains an inference from separate bodies of evidence. Finally, this review did not apply a formal risk-of-bias tool, and its search was limited to one database. Future studies should measure planning quality (for example, with a lesson-plan rubric) and delivered intensity (for example, with heart-rate monitors) in the same sample and relate both to fitness change over time.

5. Conclusion

Based on a synthesis of the existing literature, it can be concluded that lesson planning and exercise intensity are both associated with improvements in students' physical fitness in Physical Education (PE) classes. Well-structured, innovative lesson plans tailored to students' needs are linked to greater enthusiasm and participation in physical activities, and the PE teacher has a crucial role in designing engaging and enjoyable lessons. Regular exercise at moderate-to-high intensity, such as circuit training and aerobic exercise at 60–80% of maximum heart rate, is associated with better endurance and cardiorespiratory capacity, whereas irregular or insufficient activity is unlikely to bring about meaningful change in students' physical condition. Lesson planning appears to determine whether such intensity is actually delivered, but this link is inferred from separate studies and has not yet been tested directly.

PE teachers are therefore encouraged to plan learning processes that state target intensity, include progression, and monitor students' response, while keeping activities varied and enjoyable. Future researchers should conduct field studies that measure lesson planning quality and delivered exercise intensity in the same sample, preferably with experimental or longitudinal designs, to test the relationship between them and physical fitness.

6. Author Contribution

Nur Salwa and Fatimah Lasmi contributed to the conceptualization and design of the review. Nur Salwa conducted the literature search and prepared the initial manuscript. Fatimah Lasmi assisted in reviewing and analyzing the selected articles. Andi Muhammad Syahril and Muhammad Naufal Muzhaffar Yamin contributed to data collection, article screening, and interpretation of the findings. Donal assisted in organizing the literature and critically reviewing the manuscript. Muh. Syarwan Amin supervised the review process and provided critical feedback on the manuscript. All authors contributed to the discussion, reviewed the final manuscript, and approved the final version for publication.

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