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The Effect of a Music-Based Fitness Exercise Program on Students' Physical Fitness

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ABSTRACTS

This research addresses the need for engaging and structured physical activity programs capable of enhancing students' physical fitness. Music-based fitness exercise programs represent an alternative approach within physical education (PJOK), combining a sequence of movements with musical accompaniment; however, their impact on students' physical fitness requires empirical validation. This study aims to determine the effect of a music-based fitness exercise program on students' physical fitness. An experimental method with a one-group pretest-posttest design was employed. The study population consisted of 539 female students, from which a sample of 30 students was selected using purposive sampling. The intervention utilized the "2012 Physical Fitness Exercise" program, implemented in a structured manner. The Indonesian Physical Fitness Test (TKJI) for the 16–19 age group was used as the measurement instrument. The analysis yielded a t-value of $t(29) = -13.259$, with $p < 0.001$. Since the p-value is less than $\alpha = 0.05$, there is a significant difference between the pretest and posttest scores. The mean difference is -2.80, indicating that the posttest scores were higher than the pretest scores. These results demonstrate that the music-based fitness exercise program has a significant effect on improving students' physical fitness. Descriptively, the mean physical fitness score increased by 2.80 points from 13.07 in the pretest to 15.87 in the posttest. Inferentially, this difference is statistically significant ($p < 0.001$).

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INTRODUCTION

Physical fitness is an important aspect of physical education because it relates to an individual's ability to carry out physical activities effectively and maintain physical capacity to support daily activities (Adritya & Mashud, 2025; Nurdin & Kurnia, 2024; Bile et al., 2021) . During adolescence, the development of physical fitness becomes increasingly important because this period is a developmental phase characterized by changes in physical abilities, motor skills, and activity patterns (Rusli et al., 2022; Aulia et al., 2022) . Schools have a strategic position in providing opportunities for students to engage in regular physical activity through Physical Education, Sports, and Health (PJOK) learning (Ningrum et al., 2022). Through structured learning, physical activity in schools is not only directed at mastering motor skills, but also at developing physical fitness as part of achieving physical education goals (Rivai et al., 2022; Marsuna et al., 2024).

The importance of physical activity interventions in school settings has been widely demonstrated through previous research. (Wang et al., 2026), through a systematic review and meta-analysis of school-based interventions, showed that physical activity interventions in school settings can contribute to improving various health and fitness indicators in children and adolescents. These findings indicate that schools are a potential environment for providing systematic physical activity interventions. In line with these findings, van de Kop et al., (2019) through a review of 40 studies in adolescents showed that school-based physical activity interventions can increase physical activity levels, especially when these activities are integrated with learning and supported by the involvement of school personnel. Thus, physical education (PJOK) learning can be a strategic means to provide regular physical activity stimuli to students.

Furthermore, Wu et al., (2023) through a systematic review and network meta-analysis of 66 studies with 8,578 participants showed that various forms of school-based exercise influence the physical fitness components of children and adolescents. The study found that aerobic exercise, strength training, high-intensity interval training , combination training, and other forms of activity have different characteristics of influence on fitness components. Findings reinforce the view that selecting the form of physical activity is a crucial aspect in efforts to improve students' physical fitness . Therefore, research on simple, structured, engaging activities that can be applied in physical education learning remains necessary.

While general physical activity interventions effectively enhance physical health in school settings, structured exercise routines require specific pedagogical mechanisms to sustain movement quality and student adherence. Fitness gymnastics with musical accompaniment addresses this by leveraging musical audio, rhythm, and tempo as continuous external auditory cues. These rhythmic stimuli help regulate exercise cadence, optimize exertion levels, and

maintain movement consistency across all phases of structured routines like the SKJ 2012. Álamo-Martínez et al. (2024), in a systematic review of music and physical fitness in physical education, confirmed that music-integrated programs positively impact adolescents' physical fitness, movement regulation, exercise motivation, and psychosocial well-being. However, despite these encouraging trends, empirical research specifically investigating how music-based, structured routines like SKJ 2012 maintain movement consistency and impact fitness in physical education classes remains limited.

These findings are important because music can be viewed not only as a supporting element in gymnastics activities but also as part of the program characteristics that can make physical activity more attractive to students. In physical education (PJOK) learning, student engagement in physical activity is a crucial factor in ensuring students receive adequate movement stimulation. Vaquero-Solís et al., (2020), through a systematic review of 41 studies on school-based physical activity interventions, demonstrated the importance of motivational aspects in the successful implementation of physical activity in the school environment. The study also showed that intervention characteristics and implementation sustainability need to be considered when designing physical activity programs for children and adolescents.

Although evidence regarding the effectiveness of school-based physical activity is growing, there are still research gaps that need to be addressed. Most previous studies have focused on general physical activity interventions, such as aerobic exercise, strength training, high-intensity interval training, or multicomponent programs. Wu et al. (2023) compared several school-based exercise modalities but did not specifically examine the Gymnastics Physical Fitness program, a form of music-based exercise. Meanwhile, Álamo-Martínez et al. (2024) demonstrated the positive potential of using music in physical education, but they also emphasized the limited research on music and physical fitness programs for adolescents.

This gap becomes particularly critical within the context of physical education (PJOK) in Indonesia, especially regarding adolescent girls. Female students frequently demonstrate lower physical fitness levels, reduced exercise motivation, and lower overall physical activity participation compared to their male peers, often due to a lack of engaging and non-intimidating activity options in school settings. While fitness gymnastics is characterized by a systematic series of movements with musical accompaniment that is well-suited for group execution, its widespread familiarity in schools does not automatically guarantee measurable fitness enhancements. Given that adolescent girls require enjoyable, rhythmically structured physical activities to foster movement adherence and improve physical capacity, empirical evaluation of such interventions remains essential. Therefore, this study uniquely examines the impact of a music-based fitness exercise program specifically on the physical fitness of female students.

The main problem in this study is that it is not yet empirically known whether the implementation of a music-based fitness exercise program can improve students' physical fitness. This issue is important to study because high school students need opportunities for regular physical activity, while physical education (PJOK) learning is limited in time and requires activities that are practical, engaging, and can be done together. A music-accompanied exercise program has the potential to be an alternative because it can be implemented in groups without the need for complex equipment. However, this potential needs to be proven through data on changes in students' physical fitness.

Based on these problems, the problem-solving approach in this study was carried out by providing a structured fitness exercise program to female students. Changes in physical fitness were evaluated using a one-group pretest-posttest experimental design , namely by taking measurements before and after the program was administered. Measurements used the Indonesian Physical Fitness Test (TKJI) for the 16-19 year old age group so that changes in students' fitness conditions could be observed systematically. This approach was chosen because it was in accordance with the research objectives that focused on changes in physical fitness after students received a music-based fitness exercise program. Thus, this study aimed to analyze the effect of a music-based fitness exercise program on students' physical fitness . Academically, this study is expected to add empirical evidence regarding the use of music-based gymnastics in Physical Education (PJOK) learning, especially in relation to improving students' physical fitness . Practically, the results of the study are expected to be a consideration for PJOK teachers in selecting and implementing structured, interesting, easy-to-implement gymnastics activities that are oriented towards improving students' physical fitness.

METHOD

If the data met the assumption of normality, analysis was conducted using a paired-samples t-test with a significance level of $\alpha = 0.05$. To complement statistical significance, the magnitude of change was further quantified using the percentage increase and Cohen's d effect size ($d = \frac{\text{Mean Difference}}{SD_{\text{diff}}}$) to provide a comprehensive assessment of physical fitness improvements following the intervention. peningkatan dan ukuran efek (effect size) agar perubahan physical fitness tidak hanya dilihat berdasarkan signifikansi statistik, tetapi juga berdasarkan besarnya perubahan setelah intervensi.

This study employed a quantitative experimental approach utilizing a one-group pretest-posttest design. In this framework, a single cohort of subjects underwent an initial baseline measurement (O_1), received the music-based Physical Fitness Gymnastics (SKJ 2012) intervention (X), and completed a final post-intervention assessment (O_2). While this design effectively measures individual fitness changes before and after the intervention, its lack of a control group limits the ability to rule out potential confounding variables, such as natural maturation or external physical activities.

The study was conducted at SMK Negeri 1 Kendari, Kendari City, Southeast Sulawesi. The study location was chosen because it had students in the age group that matched the characteristics of the Indonesian Physical Fitness Test (TKJI) instrument aged 16-19 years and allowed for the implementation of group exercise programs in PJOK learning activities (Nurhasan, 2001). The study population consisted of 539 female students of SMK Negeri 1 Kendari. The study sample consisted of 30 female students selected using a purposive sampling technique. Subject selection was based on predetermined criteria, namely female students aged 16-19 years, registered as active students, able to participate in physical activities, and willing to participate in the entire series of studies. Prior to the study, subjects were given an explanation of the objectives, procedures, benefits, and series of research activities. Consent for participation was obtained before data collection.

The research was conducted in three distinct stages: pretest, intervention, and posttest. In the first stage, baseline physical fitness data were collected using the standardized Indonesian Physical Fitness Test (TKJI) battery for the 16–19 age group under uniform test conditions. The second stage involved the execution of the exercise intervention. To ensure high intervention replicability, the exercise protocol was structured according to the FITT principles (Frequency, Intensity, Time, and Type) as follows:

1. Type: Music-based Physical Fitness Gymnastics 2012 (SKJ 2012) routine, combining structured aerobic movements with rhythmic audio accompaniment.
2. Frequency: Conducted 3 sessions per week over a 6-week period, totaling 18 intervention sessions.
3. Time: Each session lasted 45 minutes, consisting of a 10-minute warming-up phase, a 25-minute core SKJ 2012 movement routine, and a 10-minute cooling-down phase.
4. Intensity: Maintained at moderate intensity (60%–75% of HR_{max}), guided continuously by standardized musical audio at a tempo of 120–140 beats per minute (BPM).

During intervention sessions, subjects executed the movements collectively in a synchronized manner following the prescribed sequence and tempo under the supervision of the researchers. The third stage was the posttest, where subjects completed the TKJI protocol under conditions identical to the pretest to evaluate post-intervention fitness changes.

The instrument used to measure physical fitness is the Indonesian Physical Fitness Test (TKJI) for ages 16–19. The TKJI is used to obtain an overview of students' physical fitness levels through a series of test components appropriate to the subject's age group. The test was conducted in a standardized manner, taking into account subject readiness, field conditions, equipment, implementation sequence, instructions, and result recording procedures. To maintain measurement consistency, the pretest and posttest were conducted using the same procedure. Researchers provided the same instructions to all subjects and ensured relatively uniform implementation conditions. The results of each test component were recorded in

accordance with the TKJI assessment guidelines, then converted into a physical fitness level score according to the norms for the 16–19 age group .

The research data were analyzed quantitatively using descriptive and inferential statistics. Descriptive analysis was used to describe the minimum, maximum, average, and standard deviation values of the pretest and posttest results . Before hypothesis testing, the data were tested for normality to determine the suitability of using parametric analysis. Hypothesis testing was conducted by comparing physical fitness scores before and after the music-based SKJ 2012 program. If the data met the assumption of normality, analysis was conducted using a paired-samples t-test with a significance level of a = 0.05. The magnitude of change can also be supplemented with the percentage increase and effect size so that changes in physical fitness are not only seen based on statistical significance, but also based on the magnitude of change after the intervention.

RESULTS

Physical fitness measurements were carried out before and after providing a music-based fitness exercise program to 30.

Table 1. Descriptive Statistics of Physical Fitness Before and After Fitness Exercises

Statistics	Pretest	Posttest
N	30	30
Minimum	11.00	12.00
Maximum	16.00	19.00
Average	13.07	15.87
Median	13.00	16.00
Mode	12.00	17.00
Standard deviation	1.44	1.48
Variance	2.06	2.19

The results of the descriptive analysis showed that the pretest score had a minimum value of 11 and a maximum of 16, with an average of 13.07 ± 1.44. After being given the 2012 SKJ program, the posttest score had a minimum value of 12 and a maximum of 19, with an average increase to 15.87 ± 1.48. Thus, there was an average increase of 2.80 points.

Table 2. Distribution of Physical Fitness Improvement

Improvement statistics	Mark
N	30
Minimum	0.00
Maximum	5.00
Average	2.80
Median	3.00
Mode	3.00
Standard deviation	1.16
Variance	1.34

Descriptively, the data showed a shift in physical fitness scores toward higher levels after the intervention. In the pretest , the highest score was 16, while in the posttest, it increased to 19. The average score also increased from 13.07 to 15.87.

Table 3. Frequency Distribution of Physical Fitness Improvement

Range of increase	Frequency	Percentage
0.0–1.0	1	3.33%
1.1–2.1	9	30.00%
2.2–3.2	13	43.33%
3.3–4.3	5	16.67%
4.4–5.4	2	6.67%
Total	30	100%

Based on the distribution of improvements, most students experienced improvements in physical fitness . The largest increase was in the 2.2–3.2 range, with 13 students, while 5 students were in the 3.3–4.3 range.

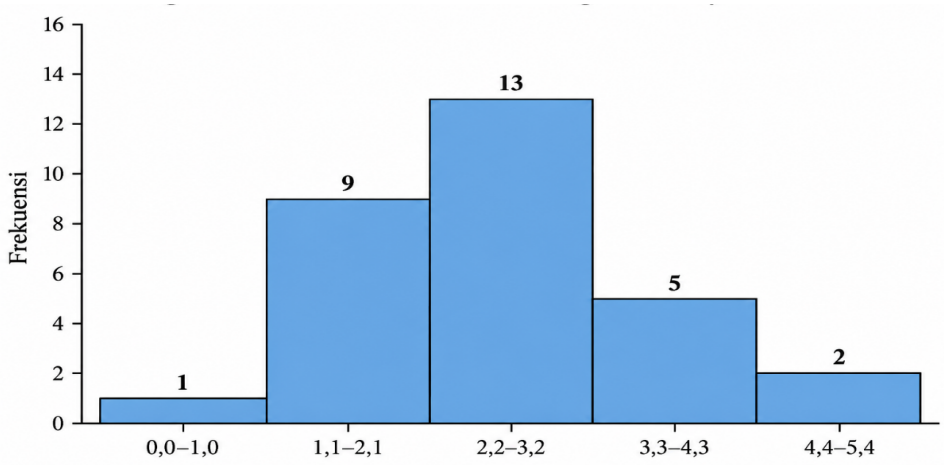


Figure 1. Histogram of Physical Fitness Improvement

Table 4. Normality Test Results

Data	Kolmogorov-Smirnov	Sig.	Information
Pretest	0.171	0.109	Normal
Posttest	0.145	0.070	Normal

A normality test was performed before hypothesis testing. Based on the Kolmogorov–Smirnov test, the pretest data had a significance value of 0.109, while the posttest data had a significance value of 0.070. Both values are greater than a = 0.05, indicating that the data are normally distributed and meet one of the assumptions for parametric analysis.

Table 5. Paired-Samples t-Test Results

Comparison	Mean Difference	Elementary School	SE	t	df	p
Pretest-Posttest	-2.80	1,157	0.211	-13,259	29	<0.001

Hypothesis testing was conducted using paired-samples t-test to determine the difference in physical fitness scores before and after the 2012 SKJ program. The analysis results showed a value of $t(29) = -13.259$ with $p < 0.001$. Because the p value is smaller than $a = 0.05$, there is a significant difference between the pretest and posttest scores . The average difference is -2.80, which indicates that the posttest score is higher than the pretest . Based on these results, the music-based fitness exercise program shows a significant effect on improving students' physical fitness . Descriptively, the average physical fitness increased by 2.80 points, from 13.07 in the pretest to 15.87 in the posttest . Inferentially, the difference is significant with $p < 0.001$.

DISCUSSION

The research results show that a music-based fitness exercise program has an impact on students' physical fitness. These findings indicate that structured exercise activities accompanied by music can provide a positive stimulus to students' physical fitness. Conceptually, physical fitness improvements occur when students receive regular, structured physical activity that is appropriate to their physical abilities. In the context of physical education learning, gymnastics is a form of activity that allows teachers to provide movement stimuli systematically while actively involving students in the learning process.

The findings of this study align with those of Gustiansyah et al. (2026), who found that circuit training using music provided better results for the physical fitness of elementary school students compared to conventional learning. The study involved 56 students and provided a 10-session intervention accompanied by music at a tempo of 140 BPM. The results showed a significant difference in physical fitness between the group receiving training with music and the control group. These similar findings suggest that music can be integrated into physical activity as part of a learning design that supports improving student fitness.

The results of this study were also supported by Surur et al. (2025), who developed a physical fitness program utilizing digital music for elementary school children. The program was declared suitable for use after expert validation and trials, with the music chosen using a pleasant and energetic rhythm to support the enthusiasm and rhythm of the students' movements. These findings explain that music not only serves as a backdrop for gymnastics activities but can also be used to help regulate the rhythm of movements and create a more engaging physical activity experience for students.

From a physical education learning perspective, the use of music can also provide variation to fitness learning, which has tended to be conducted through repetitive exercise. Yamin (2024) demonstrated that rhythmic gymnastics learning can be used as an alternative to improve the physical and mental fitness of elementary school students. Meanwhile, Kurnia (2025) developed a fitness training model through Pancasila Student Rhythmic Gymnastics, which combines rhythmic gymnastics with music and interactive videos to create more

engaging activities and increase student participation. These results support the view that engaging forms of physical activity that are appropriate to student characteristics are important to implement in PJOK learning.

Theoretically, the results of this study reinforce the understanding that students' physical fitness is influenced not only by the presence of physical activity, but also by how that activity is packaged and delivered to them. The use of music in an exercise program can help create a more regular rhythm of movement, enhance the learning atmosphere, and encourage students to participate more actively in the activity series. Thus, music can be a pedagogical element in designing fitness activities that are tailored to student characteristics.

Practically, the results of this study imply that a music-based fitness program can be a simple and relatively easy alternative to physical education (PJOK) instruction in schools. Teachers can select music with an appropriate tempo, develop a series of movements in stages, and adjust the intensity of the exercises to suit the students' abilities. This type of program also does not require complex equipment, making it feasible to implement in schools with limited facilities. Therefore, music-based fitness programs have the potential to be a learning strategy that integrates physical activity, movement regularity, and a more engaging learning experience to support the improvement of students' physical fitness.

Despite the positive outcomes demonstrated, several methodological limitations must be candidly acknowledged when interpreting the findings of this study. First, the research employed a one-group pretest-posttest experimental design without a control or comparison group. As a result, while a statistically significant improvement in physical fitness was recorded following the 6-week intervention, the study design cannot fully isolate the intervention effect from unmonitored confounding variables. External influences such as natural biological maturation, test-retest learning effects, or unmeasured out-of-school physical activities and daily chores could have partially contributed to the observed score gains. To establish firmer causal relationships, future studies should utilize randomized controlled trials (RCTs) or quasi-experimental designs featuring a control group receiving non-music physical exercise or standard physical education instruction.

Second, the study is constrained by its sample size and demographic scope. The intervention involved a relatively small sample of 30 female students drawn exclusively from a single institution (SMK Negeri 1 Kendari, Southeast Sulawesi). Although this homogeneous sample provided a controlled setting for evaluating adolescent girls, it limits the external validity and generalizability of the findings to male students, different age brackets, or secondary schools in other geographical regions with differing baseline physical activity patterns. Subsequent research should expand the sample size, encompass co-educational and multi-school cohorts across urban and rural settings,

CONCLUSION

Based on the research results, it can be concluded that a music-based fitness exercise program has a positive impact on students' *physical fitness* . The use of music in exercise activities can support regular movement, create a more engaging learning environment, and encourage student engagement during physical activity. These findings suggest that music-based exercise can be an alternative structured physical education learning activity to stimulate students' physical fitness.

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