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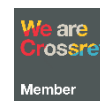
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The effect of traditional games on students' gross motor skills, physical fitness, and social skills

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ABSTRACT

This study examined the effect of a structured traditional games intervention on gross motor skills, physical fitness, and social skills among elementary students. A quantitative quasi-experimental one-group pretest–posttest design was applied to 57 fifth-grade students (aged 10–11 years) at SD Telkom Padang, Indonesia. The intervention consisted of selected traditional games conducted over six weeks (three sessions per week, 70 minutes each). Gross motor skills were measured using TGMD-2, physical fitness using the Indonesian Student Fitness Test (TKSI), and social skills using the SSRS teacher rating scale. Data were analyzed using MANOVA to examine simultaneous effects across variables. Results showed a significant multivariate effect (Pillai's Trace = 0.415, $F = 25.993$, $p < 0.05$; $\eta^2p = 0.415$). Univariate tests indicated significant improvements in gross motor skills ($F = 56.959$; $\eta^2p = 0.337$), physical fitness ($F = 41.011$; $\eta^2p = 0.268$), and social skills ($F = 58.553$; $\eta^2p = 0.343$). These findings suggest that structured traditional games can support multidimensional student development in physical education.



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Introduction

Physical education plays a central role in supporting children's holistic development by integrating physical, cognitive, and social learning through structured movement experiences. In elementary school settings, PE is not only oriented toward physical activity participation but also toward building fundamental competencies that support lifelong engagement in active lifestyles (Suryadi & Ivanov, 2025). Within this context, the development of gross motor skills, physical fitness, and social skills becomes essential, as these domains are closely linked to children's functional independence, health status, and ability to interact effectively with peers.

Gross motor skills represent the foundation of children's movement competence, involving coordinated use of large muscle groups in activities such as running, jumping, and balancing (Mustafa & Sugiharto, 2020; Masrun, 2025). These skills are critical during elementary school years, as they

influence participation in physical activities and overall motor development trajectories. At the same time, physical fitness comprising cardiorespiratory endurance, muscular strength, flexibility, and body composition supports children's ability to perform daily activities efficiently and contributes to long-term health outcomes (Kiram et al., 2023; Warzuqni et al., 2025). However, these two domains cannot be viewed in isolation, as both are often developed simultaneously through active movement experiences.

In addition to physical aspects, social skills are equally important in PE contexts, particularly in activities that involve cooperation, communication, and rule-following. Social skills enable children to interact positively with peers, manage emotions, and participate effectively in group activities. Despite their importance, social skills are often less explicitly addressed in PE compared to motor and fitness components, even though movement-based learning environments provide natural opportunities for social interaction and development.

From a theoretical perspective, learning in PE can be understood through social constructivism, where knowledge and skills are developed through interaction, collaboration, and shared experiences. In this framework, activity-based learning allows students to construct understanding through participation rather than passive instruction. Practice theory also supports the idea that repeated engagement in meaningful physical activities can shape both motor competence and social behavior over time. These perspectives suggest that learning approaches integrating physical activity and social interaction may produce multidimensional outcomes.

However, contemporary trends indicate a shift in children's activity patterns, particularly due to the increasing dominance of digital entertainment. In Indonesia, traditional games are gradually being replaced by screen-based activities, reducing opportunities for children to engage in active, culturally rooted play (Rustan & Munawir, 2020). This shift has implications for reduced physical activity levels, which in turn affect the development of gross motor skills, physical fitness, and social interaction among children. Globally, sedentary lifestyles have been associated with increased childhood obesity rates, with reports indicating a rise of up to 20% in the past decade (Hasan & Husein, 2024).

The decline of active play in school and community environments further exacerbates the issue, as children have fewer opportunities to develop movement competence and social engagement through natural play contexts (Bafirman, 2024). In this situation, physical education must adapt by incorporating learning strategies that are both engaging and contextually relevant to students' cultural backgrounds. One potential approach is the use of traditional games, which inherently combine physical movement with social interaction.

Previous studies have shown that traditional games can contribute positively to physical literacy, including improvements in movement skills, motivation, and social interaction (Ramadani S, 2025). These activities are typically dynamic, cooperative, and rule-based, allowing students to engage physically while simultaneously developing interpersonal skills. However, most existing studies tend to examine these outcomes separately, focusing either on motor skills, physical fitness, or social aspects, rather than investigating their combined effects within a single intervention.

This indicates a clear research gap, particularly in the Indonesian elementary school context, where limited empirical studies have examined the simultaneous impact of traditional games on multiple developmental domains. Moreover, there is still a lack of research that integrates physical and social outcomes within a single analytical framework using multivariate approaches. Understanding these combined effects is important to provide a more comprehensive perspective on the value of traditional games in physical education.

Therefore, this study aims to examine the effect of structured traditional games on gross motor skills, physical fitness, and social skills among fifth-grade students at SD Telkom Padang. By addressing these variables simultaneously, this research seeks to contribute both theoretically and practically to the development of culturally relevant, activity-based learning strategies in elementary physical education.

Method

This study employed a quantitative quasi-experimental design using a one-group pretest–posttest approach. The absence of a control group was due to practical constraints in the school setting; however, efforts were made to minimize threats to internal validity through standardized procedures and consistent implementation of the intervention (Afif, 2024). The design aimed to examine changes within the same group over time, while acknowledging limitations related to causal inference.

The population consisted of 57 fifth-grade students (32 boys and 25 girls; aged 10–11 years) at SD Telkom Padang, West Sumatra, Indonesia. All students in one intact class were selected using purposive sampling based on consistent attendance, participation readiness, and parental consent. Prior to the intervention, pretest data were analyzed descriptively to ensure relatively similar baseline characteristics among participants. No participants dropped out during the study, and attendance was monitored to maintain data consistency.

Three instruments were used to measure the dependent variables. Gross motor skills were assessed using the Test of Gross Motor Development-2 (TGMD-2), which includes locomotor and object control subtests. The instrument has established international validity and reliability, and in this study, observers were trained prior to data collection to ensure scoring consistency (Pribadi et al., 2023). Physical fitness was measured using the Indonesian Student Fitness Test (TKSI), consisting of standardized components such as endurance, strength, and agility tests. Social skills were evaluated using the Social Skills Rating System (SSRS) developed by Gresham and Elliott, completed by the classroom teacher, covering dimensions of cooperation, assertion, empathy, and self-control. To reduce subjectivity, the teacher was briefed on standardized rating procedures before data collection.

The intervention consisted of structured traditional games conducted over six weeks (January 6 to February 13, 2026), with a frequency of three sessions per week, each lasting 70 minutes. Each session followed a consistent structure including warm-up, core activities involving selected traditional games (e.g., gobak sodor, bentengan, and relay-based games), and cool-down. The activities were designed to promote active movement, coordination, and group interaction. The researcher supervised all sessions to ensure consistency in implementation and monitored student engagement throughout the process.

To control external variables, students were instructed to maintain their usual daily routines outside the intervention sessions, and no additional structured physical training was introduced during the study period. Environmental conditions such as time, location, and duration of sessions were kept consistent across meetings. This approach was intended to reduce potential confounding factors such as variation in physical activity levels outside the intervention.

Data collection was conducted in two stages: pretest measurements before the intervention and posttest measurements after the intervention using identical procedures. All assessments were carried out under similar conditions to ensure comparability. A pilot test was conducted prior to the main study to ensure clarity of procedures and consistency in measurement (Mukhlis, 2019).

Data analysis was performed using SPSS. Descriptive statistics (mean, standard deviation, and N-Gain) were used to describe changes in each variable. Prior to inferential analysis, assumptions of normality, homogeneity of variance-covariance, and absence of multicollinearity were tested. Multivariate Analysis of Variance (MANOVA) was employed to examine the simultaneous effect of the intervention on the three dependent variables, considering their interrelationships (Aprianti et al., 2020). Pillai's Trace was selected as the primary test statistic due to its robustness against assumption violations. Follow-up univariate tests (Tests of Between-Subjects Effects) were conducted to examine the effect on each variable, with effect sizes reported using partial eta squared (η^2p). The level of significance was set at $\alpha = 0.05$.

Despite efforts to control procedural consistency, this study acknowledges limitations related to the absence of a control group, potential maturation effects, and limited generalizability due to the use of a single intact class. These limitations were considered in the interpretation of the findings.

Results and Discussions

The results of this research will be presented systematically through three main stages: (1) presentation of research data, (2) normality and homogeneity tests as analysis prerequisites, and (3) hypothesis testing. This study aims to analyze the effect of traditional games on gross motor skills, physical fitness, and social skills of fifth-grade students at SD Telkom Padang. The data from this research consisted of pretest and posttest results from traditional games learning. The research process unfolded in three stages: the first stage involved conducting a pretest to obtain baseline data regarding traditional games learning. The second stage was the treatment phase, which lasted 6 weeks from January 6 to February 13, 2026. The treatment was implemented with a frequency of 3-4 times per week. The pretest and posttest data for gross motor skills, physical fitness, and social skills are as follows:

Table 1. Research Data

Statistik	Gross Motor Skill (Pre)	Gross Motor Skill (Post)	Physical Fitness (Pre)	Physical Fitness (Post)	Social Skill (Pre)	Social Skill (Post)
Mean	71.32	80.00	69.12	76.93	66.53	75.51
Median	70	80	70	75	66	76
Mode	75	80	65	75	60	74
Std. Deviation	5.94	6.34	6.13	6.86	6.55	5.85
Minimum	60	70	60	65	56	64
Maximum	80	90	85	95	78	92

Based on descriptive statistical analysis, all research variables showed an increase in mean scores from pretest to posttest. The largest average increase occurred in the social skills variable (8.98), followed by gross motor skills (8.68) and physical fitness (7.81). The relatively small standard deviations across all variables indicate data homogeneity. Overall, these descriptive results suggest that the treatment provided positively impacted improvements in students' gross motor skills, physical fitness, and social skills.

The paired sample t-test confirms a statistically significant difference ($p < 0.001$) between pretest and posttest scores, indicating that the use of the developed module had a strong positive effect on students' practical performance. The large negative mean difference reflects the increase in scores from pretest to posttest.

Data analysis in this research was conducted using Multivariate Analysis of Variance (MANOVA) to determine the effect of traditional games on gross motor skills, physical fitness, and social skills of fifth-grade students at SD Telkom Padang. The analysis was performed on posttest data after students received treatment in the form of learning through traditional games.

Table 2. Box's Test of Equality

Test	Value
Box's M	13.762
F	2.227
df1	6
df2	90884.830
Sig.	0.038

A significance value of 0.038 (< 0.05) indicates that the covariance matrices between groups are not completely homogeneous. However, since the sample sizes between groups are balanced ($N = 57$ for each condition), the MANOVA analysis can still proceed as it is sufficiently robust against violations of this assumption.

Table 3. Multivariat Analysis

Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	7745.138	3.000	110.000	0.000	0.995
Permainan Tradisional	Pillai's Trace	25.993	3.000	110.000	0.000	0.415

Based on the table above, which yielded a significance value of 0.000 (< 0.05). This indicates a significant effect of traditional games on gross motor skills, physical fitness, and social skills simultaneously. The Partial Eta Squared value of 0.415 shows that 41.5% of the variation in the three dependent variables is collectively influenced by traditional games. This magnitude falls into the large effect size category. Therefore, the hypothesis stating that traditional games have a simultaneous effect on all three variables is accepted.

Tabel 4. Between-Subjects Effects Analysis

Variabel	F	Sig.	Partial Eta Squared	R Squared
Gross Motor Skills	56.959	0.000	0.337	0.337
Physical Fitness	41.011	0.000	0.268	0.268
Social Skills	58.553	0.000	0.343	0.343

For the gross motor skills variable, the pretest mean score of 71.32 increased to 80.00 on the posttest, with an average difference of 8.68. This improvement indicates positive changes in students' gross motor skills after participating in traditional games-based learning activities. For the physical fitness variable, the pretest mean score of 69.12 rose to 76.93 on the posttest, with an average difference of 7.81. Although the increase was slightly lower compared to gross motor skills, the data still demonstrates improvements in students' physical fitness condition after the treatment. Meanwhile, for the social skills variable, the pretest mean score of 66.53 increased to 75.51 on the posttest, with the highest average difference of 8.98 among the three variables. This largest difference suggests that traditional games had a quite significant impact on the development of students' social skills.

The findings of this study indicate that traditional games have a significant positive effect on gross motor skills, physical fitness, and social skills of elementary students. While the descriptive data already showed consistent improvements across all variables, the inferential analysis confirms that these changes are statistically meaningful. More importantly, beyond statistical significance, the magnitude of the effect suggests that the intervention produced substantial practical impact in the context of physical education learning (Cahyani et al., 2023; Hostrup, 2024; Muslih et al., 2021).

From a motor development perspective, the improvement in gross motor skills can be explained by the nature of traditional games, which involve repetitive, coordinated movements such as running, jumping, and directional changes. These activities stimulate neuromuscular coordination and motor control through continuous practice. This finding is consistent with previous studies showing that movement-based learning environments significantly enhance children's motor competence (Sriyahan et al., 2022). The structured implementation of games in this study likely contributed to more systematic skill development compared to unstructured play.

In terms of physical fitness, the observed improvements may be attributed to the moderate-to-high intensity of traditional games, which require sustained physical engagement. Activities involving chasing, dodging, and team-based movement can increase cardiovascular endurance, muscular strength, and overall physical conditioning. This supports previous findings that activity-based physical education approaches can effectively improve students' fitness levels through dynamic and engaging learning experiences (Aulia & Januarto, 2022). However, the relatively lower effect size compared to other variables suggests that longer intervention duration may be needed to achieve more substantial physiological adaptations.

The most prominent improvement was observed in social skills, which can be understood through the interactive and collaborative nature of traditional games. These games require communication,

cooperation, rule adherence, and conflict resolution, all of which contribute to the development of social competence. This aligns with the perspective that social learning occurs through interaction and shared experiences, as emphasized in activity-based and constructivist learning environments (Ayu & Sari, 2025). The high effect size indicates that traditional games are particularly effective in facilitating socio-emotional development in school settings.

When viewed collectively, the simultaneous effect on all three variables highlights the holistic nature of traditional games as a learning approach. Unlike conventional instruction that often separates physical and social development, traditional games integrate movement and interaction within a single activity. This finding supports the concept of comprehensive physical education, where psychomotor, cognitive, and affective domains are developed simultaneously (Muhaimin et al., 2024; Susena et al., 2021). The use of MANOVA further strengthens this conclusion by demonstrating that the intervention influences multiple interrelated outcomes at once.

From a pedagogical perspective, these findings have practical implications for physical education (PJOK) teachers. Traditional games can be used as an alternative or complementary learning strategy that promotes active participation, increases movement intensity, and enhances student engagement. Compared to conventional drill-based approaches, traditional games offer a more contextual and meaningful learning experience, which may improve student motivation and participation (Butarbutar et al., 2024; Pranata, 2022). Therefore, integrating traditional games into lesson planning can contribute to more effective and enjoyable learning environments.

At the policy level, this study also highlights the potential of traditional games to support culturally responsive education. Incorporating traditional games into school curricula not only enhances learning outcomes but also helps preserve local cultural values. This aligns with efforts to strengthen local content within the curriculum and promote character education through culturally relevant practices (Imawati V, 2021; Muhaimin et al., 2024). In this sense, traditional games serve both educational and cultural functions within the school environment.

Despite these positive findings, several limitations should be acknowledged. The use of a one-group quasi-experimental design without a control group limits the ability to draw strong causal conclusions, and improvements may be partially influenced by factors such as maturation or repeated testing effects. In addition, the study was conducted in a single school context, which may limit generalizability to other settings. Future research is recommended to employ controlled experimental designs, include larger and more diverse samples, and explore the long-term effects of traditional games on multiple developmental domains (Azassih, 2024).

Conclusions

Overall, the MANOVA analysis results indicate that traditional games had a significant effect both simultaneously and partially on gross motor skills, physical fitness, and social skills of fifth-grade students at SD Telkom Padang. The increase in posttest mean scores compared to pretest strengthens the finding that implementing traditional games in physical education (PJOK) learning not only impacts physical aspects (motor skills and fitness) but also students' social aspects. Therefore, the research hypothesis stating that traditional games influence gross motor skills, physical fitness, and social skills of fifth-grade students at SD Telkom Padang is accepted. Grounded in practice theory and social constructivism, these results advocate traditional games as a holistic, culturally relevant strategy for psychomotor, physical, and socio-emotional growth in elementary physical education.

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