



Implementation of Traditional Games to Reduce Sedentary Behavior of Elementary School Students

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Abstract

The development of digital technology and the increasing use of electronic devices in elementary school children contribute to the increase in sedentary behavior which has an impact on decreased physical fitness, impaired motor development, and reduced social interaction. This study aims to analyze the effectiveness of the implementation of traditional games in reducing the sedentary behavior of elementary school students. The study uses a quantitative approach with a quasi-experimental design through a nonequivalent control group design model. The study participants totaled 77 students in grades IV–VI consisting of the experimental group ($n = 39$) and the control group ($n = 38$). The instrument used was the Adolescent Sedentary Activity Questionnaire (ASAQ) which met the criteria of validity and reliability ($\alpha = 0.853$). Traditional game-based learning interventions were carried out for ten meetings in PE learning. Data analysis was conducted using the Wilcoxon Signed Rank Test and the Mann–Whitney U Test at a significance level of 0.05. The results showed a significant decrease in sedentary behavior in the experimental group, from 4.32 hours/day to 3.06 hours/day. These findings suggest that traditional games are effective as a learning strategy to lower the sedentary behavior of elementary school students.

How to Cite

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INTRODUCTION

Sedentary behavior in children and adolescents has become one of the global health issues that has become increasingly worrying in recent decades. The development of digital technology, the increasing use of gadgets, and the change in children's recreational patterns from physical activities to screen-based activities have led to an increase in the duration of sitting or passive activities in daily life (Wang et al., 2024). This condition not only has an impact on declining levels of physical fitness, but also increases the risk of obesity, metabolic disorders, and decreased motor skills and social interaction of children (Tracy, 2025). The educational environment also contributes to the increase in sedentary behavior because most learning activities are carried out in a sitting position for a relatively long time.

A number of studies show that low physical activity in school children is closely related to decreased opportunities for active play in their social environment. Kaneko et al., (2022) It found that limited movement-based play activities led to an increased duration of sedentary behavior in elementary school students throughout the learning day. The findings are in line with a global report that states that the vast majority of children and adolescents in the world do not meet the daily physical activity recommendations recommended by international health organizations (Guthold et al., 2020). This condition shows that interventions that are able to increase physical activity in an attractive and sustainable manner are indispensable in the educational environment.

One approach that has the potential to be a solution is the integration of traditional games in physical education learning. Traditional games have the characteristics of movement activities that involve various movement patterns such as running, jumping, dodging, and teamwork. In addition to providing physical benefits, traditional games also contain social and cultural values that can strengthen interaction between students (Irmansyah et al., 2020). Previous research has shown that games such as gobak sodor, fort, and engklek are able to increase students' physical activity while strengthening cooperation and motivation to learn (Lathifah et al., 2025). In addition, the local culture-based approach to games is considered more attractive to students because it provides a fun and contextual learning experience.

Although various studies have highlighted

the benefits of traditional play on improving students' physical fitness and motor skills, studies that specifically examine its effect on the decline of sedentary behavior are still relatively limited. Most previous studies have focused more on aspects of increased physical activity or motor development, but have not directly measured changes in sedentary behavior using standardized instruments (Cowley et al., 2021). Thus, there are research gaps that need to be studied further, especially regarding the effectiveness of traditional games as an intervention to reduce the duration of sedentary behavior in elementary school students.

Based on this background, this study aims to analyze the effectiveness of the implementation of traditional games in reducing the sedentary behavior of elementary school students. This research lies in three main aspects. First, this study positions traditional games not just as a medium to increase participation or physical fitness, but specifically as an intervention to reduce sedentary behavior in elementary school students. Second, this study quantitatively measured changes in sedentary behavior using the Adolescent Sedentary Activity Questionnaire (ASAQ) instrument, thus providing more specific empirical evidence about behavior changes, rather than just general observations of students' movement activities. Third, this study integrates a physical education approach that is responsive to local culture with a health promotion perspective, thereby linking traditional play practices with contemporary sedentary lifestyle challenges in school-age children. Thus, this study expands on previous studies that tended to place traditional games only in the perspective of motor learning, physical activity participation, or cultural preservation.

Based on this description, this study aims to analyze the effectiveness of the implementation of traditional games in reducing sedentary behavior in elementary school students. The results of this research are expected to contribute theoretically to the development of school-based active lifestyle interventions, as well as practically become the basis for designing physical education learning models that are more meaningful, fun, contextual, and relevant to children's health needs and movement behavior.

METHOD

This study uses a quantitative approach with a quasi-experimental design (quasi-experimental design) through the model nonequivalent

control group design. This design allowed researchers to compare two groups that were not randomly selected but had relatively comparable basic characteristics. In this design, both groups are given initial measurements (Pretest) and final measurement (posttest), so that the behavioral changes that occur after treatment can be analyzed. The quasi-experiential approach is widely used in education research because it allows testing the effectiveness of an intervention in a real learning situation without changing the class structure that has been established by the school (Cham et al., 2024).

The research was carried out at At Tegalandah State Elementary School, Rancakalong District, Sumedang Regency, West Java. The study participants totaled 77 students from grades IV, V, and VI with an age range of 9–13 years. Participants were selected using purposive sampling techniques with the criteria of students who were indicated to have sedentary behavior based on the results of initial measurements using sedentary behavior instruments. Furthermore, participants were divided into two research groups, namely the experimental group of 39 students and the control group of 38 students. The composition of the participants consisted of 34 male students and 43 female students. Group selection is carried out based on existing classes to maintain the integrity of the learning process at school.

The research procedure is carried out through four main stages, namely the preparation stage, Pretest, implementation of interventions, and posttest. In the preparation stage, the researcher coordinates with the school, takes care of research licensing, and prepares learning instruments and tools that will be used during the research. Stages Pretest It was carried out to measure the initial level of students' sedentary behavior before being given treatment. Furthermore, the intervention stage was carried out for ten meetings in physical education learning. In the experimental group, students participated in traditional game-based learning activities such as gobak sodor, dragon snake, clogs, jumping rope and engklek which required active involvement in movement activities. Meanwhile, the control group followed physical education learning with conventional methods without the integration of traditional games. After the entire intervention session is completed, the posttest It is carried out to remeasure the level of students' sedentary behavior so that the changes that occur can be analyzed comparatively. This systematic research procedure aims to ensure that the effects of treatment can be observed measurably and objectively

(Shirvani et al., 2019).

Data collection was carried out using questionnaires Adolescent Sedentary Activity Questionnaire (ASAQ) which is used to measure the duration of sedentary activities in school-age children. This instrument is widely used in sedentary behavior research because it is able to identify various passive activities such as the use of digital devices, watching television, and other sitting activities in daily life. The filling of the instrument is done classically with the assistance of the researcher to ensure that each student understands the question item correctly. In addition to using questionnaires, researchers also conducted observations during the learning process to see the level of student involvement in traditional game activities. The use of survey instruments in the context of physical education learning is considered to be able to provide a more comprehensive picture of physical and sedentary activity behavior (Liu et al., 2025).

Data analysis is carried out through two stages, namely descriptive analysis and inferential analysis. Descriptive analysis was used to describe the characteristics of the research data through mean scores, standard deviations, and distribution of students' sedentary behavior categories before and after the intervention. Next, an inferential analysis was performed to test the differences in sedentary behavior changes between the experimental group and the control group. The results of the normality test showed that the research data was not normally distributed, so the analysis was continued using nonparametric statistical techniques. The Wilcoxon Signed Rank Test was used to determine changes in sedentary behavior in the experimental group before and after the intervention, while the Mann–Whitney U Test was used to analyze the difference in changes between the two study groups. The use of statistical analysis methods in quasi-experimental research aims to ensure that the results of the study have empirical validity and are able to explain the effectiveness of the intervention objectively (Valentelyte et al., 2022).

Before being used in the main study, the research instrument is first tested for validity and reliability. The validity test was carried out using the Pearson Product Moment correlation of 11 statements in the trial sample of 33 students. The test results showed that all items had a correlation coefficient value greater than the r -value of the table at a significance level of 5%, so that all items were declared valid. Next, the reliability test was performed using Cronbach's Alpha coefficient and yielded a value of 0.853 indicating a

very high level of reliability ($\alpha > 0.70$). Thus, the research instrument was declared valid and reliable and suitable for measuring sedentary behavior in elementary school students.

RESULTS AND DISCUSSION

This research was carried out for six weeks in the even semester of the 2025/2026 school year at At Tegalandah State Elementary School, Rancakalong District, Sumedang Regency. The research subjects consisted of 77 students in grades IV–VI who were divided into two groups, namely the experimental group (39 students) and the control group (38 students). The experimental group followed traditional game-based PE learning for ten meetings, while the control group followed conventional PE learning according to the school program. Measurements of sedentary behavior were carried out before the intervention (pretest) and after the intervention (posttest) using the Adolescent Sedentary Activity Questionnaire (ASAQ) instrument.

To interpret the level of sedentary behavior of students, this study uses a classification of the duration of sedentary activity based on the category of daily time as shown in **Table 1**.

Table 1. Classification of Sedentary Behavior

Duration	Category
>5Hours/day	Height
2-5Hours/day	Medium
<2 hours/day	Low

Based on this classification, the results of descriptive statistical analysis of students' sedentary behavior in the experimental and control groups are presented in **Table 2**.

Table 2. Descriptive Statistics of Sedentary Behavior

Group	Measure-ment	N	Mean	SD	Min	Max
Experi-ment	Pre Test	39	4,323684211	1,64093	1,2	8,1
Experi-ment	Post Test	39	3,061538462	0,73076	1,7	4,8
control	Pre Test	38	4,255263158	1,49859	1	7,2
control	Post Test	38	4,192105263	1,45924	1	7

Table 2 shows that traditional game-based learning interventions provide quite significant changes to the sedentary behavior of elementary school students. In the experimental group, the average duration of students' sedentary behavior at the pretest stage was 4.32 hours per day (SD = 1.64) with a range of between 1.2 to 8.1 hours per

day. After being given a traditional game-based learning intervention for ten meetings, the average posttest score decreased to 3.06 hours per day (SD = 0.73) with a range of 1.7 to 4.8 hours per day. The average decrease of 1.26 hours per day showed a descriptively substantial change in sedentary behavior.

The decline was also followed by a reduction in the standard deviation value from 1.64 to 0.73, indicating that the distribution of students' sedentary behavior after the intervention became more homogeneous. This shows that most students experience a tendency to decrease sedentary activity time after participating in traditional game-based learning.

In contrast, the control group showed relatively small changes. The average pretest score in the control group was 4.25 hours per day (SD = 1.49) and only slightly decreased at the posttest stage to 4.19 hours per day (SD = 1.46). The difference in change of 0.06 hours per day showed that without a structured physical activity-based intervention, students' sedentary behavior was less likely to experience significant changes.

Table 3. Distribution of Sedentary Behavior Categories

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Category	Pre Test	Pre Test %	Post Test	Post Test%
Low	4	10%	2	5%
Medium	17	44%	37	95%
Height	18	46%	0	0%
Total	39	100%	39	100%
Control				
Category	Pre Test	Pre Test %	Post Test	Post Test%
Low	3	8%	3	8%
Medium	16	42%	20	53%
Height	19	50%	15	39%
Total	38	100%	38	100%

Based on **Table 3**. The distribution of sedentary behavior categories also showed different patterns of change between the two groups. In the experimental group before the intervention, as many as 46% of students were in the high category, 44% in the medium category, and 10% in the low category. After the intervention, the high category decreased drastically to 0%, while the medium category increased to 95%, and the low category by 5%. This shift in distribution indicates that traditional game-based learning is able to reduce the high tendency for sedentary behavior in students.

In contrast, in the control group there was no significant change in distribution. The high category only decreased from 50% to 39%, the medium category increased from 42% to 53%, and the low category remained at 8%. This condition suggests that natural changes in sedentary behavior without intervention are relatively limited.

Before hypothesis testing is carried out, a statistical assumption test is first carried out. The results of the normality test using Kolmogorov–Smirnov and Shapiro–Wilk showed a significance value of $p < 0.05$, so the data were not normally distributed. In addition, the variance homogeneity test using Levene's Test also showed a significance value of $p < 0.05$, which indicates that variance between groups is not homogeneous. Therefore, the analysis was continued using a nonparametric statistical approach.

The results of the Wilcoxon Signed Rank Test in the experimental group showed a value of $Z = -2.443$ with a significance of $p = 0.015$ ($p < 0.05$). These findings show that there was a significant difference between pretest and posttest scores in the experimental group. A total of 31 students experienced a decrease in sedentary scores, while 8 students experienced an increase, indicating that traditional play interventions had a significant impact on changes in students' sedentary behavior.

Meanwhile, the results of the Mann–Whitney U test on the posttest score showed a value of $p = 0.126$ ($p > 0.05$), meaning that there was no significant difference directly between the experimental group and the control group at the final stage of measurement. However, when the analysis of the gain score (pretest–posttest difference) was carried out, a value of $Z = -5.705$ with a significance of $p = 0.000$ ($p < 0.05$). These results showed a very significant difference in improvement between the experimental group and the control group. The mean rank value of the experimental group of 24.87 which was lower than that of the control group of 53.50 indicated that a greater decline in sedentary behavior occurred in the group that received the traditional game intervention.

The findings of this study show that the integration of traditional games in physical education learning has a significant contribution in lowering the sedentary behavior of elementary school students. These results confirm that learning strategies that emphasize active and participatory physical activity can be an effective approach in overcoming sedentary lifestyle tendencies in school-age children.

Theoretically, sedentary behavior in children is often influenced by increased exposure to digital technology, such as the use of gadgets, television, and electronic games that encourage long-term sitting. This condition has the potential to reduce children's daily physical activity levels and increase the risk of various health problems such as obesity, metabolic disorders, and decreased cardiorespiratory fitness (Singh et al., 2024). Therefore, schools have a strategic role in providing a learning environment that is able to actively encourage student movement activities.

A significant decrease in sedentary behavior in the experimental group in this study suggests that traditional games can be an effective learning medium to increase students' physical activity. Traditional games generally involve basic movements such as running, jumping, throwing, and moving dynamically in groups, thus naturally increasing the intensity of students' physical activity during the learning process (Irmansyah et al., 2020).

In addition, the characteristics of traditional games that are competitive, collaborative, and fun can also increase students' intrinsic motivation to actively participate in physical activities. (Suherman et al., 2024). Fun play activities tend to increase student engagement in physical education learning compared to repetitive or monotonous practice approaches (Quiñones Treinta et al., 2025).

The findings of this study also reinforce the concept of physical literacy, which emphasizes the importance of meaningful movement experiences in forming lifelong habits of physical activity. Through traditional games, students not only do physical activities, but also develop motor skills, social interaction, and confidence in participating in movement activities (Thuc et al., 2024).

On the other hand, the absence of significant differences in posttest scores between the two groups suggests that in quasi-experimental designs, comparisons of final scores do not always accurately reflect the impact of the intervention. Analysis of Gain Score Change often provide a more sensitive picture of the effectiveness of an intervention because it takes into account the initial conditions of each group (Cham et al., 2024). This was evident in this study, where the gain analysis showed a very significant difference between the experimental and control groups.

Practically, the results of this study show that traditional games can be an effective, inexpensive, and easily applied learning strategy in the context of physical education in elementary

schools. Unlike technology-based approaches or modern sports equipment that require special facilities, traditional games can be implemented with relatively minimal resources but are still able to provide significant benefits for the improvement of students' physical activity.

Furthermore, the integration of traditional games in physical education learning also has strategic value in efforts to preserve local culture. Traditional play activities not only function as a means of improving physical fitness, but also as a medium for transmitting cultural values, cooperation, and sportsmanship to the younger generation (Dais-Mohadali, 2025; Rakhoveio et al., 2025).

Thus, the findings of this study confirm that traditional play-based physical education learning approaches are not only relevant in the context of cultural preservation, but also have great potential as an intervention strategy to reduce sedentary behavior and improve the quality of physical activity of primary school students.

CONCLUSION

The results of the study show that the implementation of traditional games in physical education learning is effective in reducing sedentary behavior in elementary school students. Traditional game activities that are active, participatory, and fun are able to increase student involvement in physical activities thereby reducing the duration of sedentary activities. These findings suggest that the integration of traditional games not only serves as a learning medium based on local culture, but also as an effective pedagogical strategy in encouraging an active lifestyle in students.

Based on these findings, physical education teachers are advised to systematically integrate traditional games in learning to increase students' physical activity. School principals are expected to provide support through school policies that encourage active learning programs and the provision of adequate play spaces. For students, involvement in traditional games can help form active living habits and reduce reliance on screen-based activities. Further research is recommended to involve a wider sample, longer duration of intervention, and use more objective physical activity measures to obtain more comprehensive results.

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