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Effects of traditional games on elementary school students' focus and self-control in physical education: A quasi-experimental study

Novita Nur Synthiawati*[1], Zakaria Wahyu Hidayat[1]

[1]Department of Physical Education, Faculty of Education, Universitas PGRI Jombang, Jombang, East Java, Indonesia

*Correspondence: novitanurs.stkipjb@gmail.com

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Abstract

Traditional games may provide meaningful learning experiences that support students' attentional engagement and self-regulation during physical education. This study examined the effects of traditional games on focus and self-control among elementary school students. A quasi-experimental pretest–post-test control-group design was employed at SD Negeri 1 Grogol, Diwek District, Jombang Regency, Indonesia. The participants were 60 fifth-grade students, comprising 30 students in the experimental group and 30 in the control group. The experimental group participated in physical education lessons incorporating four traditional games: *gobak sodor*, *engklek*, *boy-boyan*, and *bentengan*, whereas the control group received regular physical education instruction. Focus was assessed using a 20-item questionnaire, while self-control was measured using a 32-item questionnaire, both employing a four-point Likert scale. Data were analyzed using descriptive statistics, paired-samples t-tests, and independent-samples t-tests comparing change scores. Both groups demonstrated significant improvements in focus and self-control (all $p < 0.001$). However, the between-group difference in focus improvement was not statistically significant (mean difference = 0.80, $p = 0.242$, Cohen's $d = 0.305$). In contrast, the experimental group demonstrated significantly greater improvement in self-control than the control group (mean difference = 1.47, $p = 0.018$, Cohen's $d = 0.629$), indicating a moderate effect. These findings suggest that integrating traditional games into physical education may offer additional benefits for developing self-control, although its added effect on focus was not statistically demonstrated. Traditional games may therefore serve as a pedagogically relevant approach to supporting students' behavioral and emotional regulation in elementary physical education.

Keywords: traditional games; focus; self-control; physical education; elementary school students; quasi-experimental study.

INTRODUCTION

Physical education is an important component of elementary education because it provides opportunities for children to develop movement competence, social skills, and behavioral regulation. Effective participation in physical education requires more than the ability to perform motor tasks. Students must also pay attention to instructions, follow activity rules, respond to changing situations, and regulate their behavior when interacting with peers. These demands make focus and self-control relevant outcomes for evaluating the educational contribution of physical education. Research on physical activity and children's cognitive

development has indicated that movement-based interventions may support cognitive functioning, although the magnitude of these benefits depends on the nature and characteristics of the activities provided (Donnelly et al., 2016; Zang et al., 2024).

Focus and self-control are related but distinct constructs. In the present study, focus refers to students' ability to direct and maintain attention toward relevant learning activities while minimizing distraction. Self-control refers to their capacity to regulate behavioral responses and emotional reactions in accordance with rules and situational demands. These capacities are conceptually associated with executive functions, which support goal-directed behavior through processes such as inhibitory control, working memory, and cognitive flexibility. Diamond and Lee (2011) emphasized that children's executive functions can be supported through interventions that provide meaningful opportunities to practice cognitive and behavioral regulation. In physical education, activities that require students to monitor their surroundings, respond selectively to instructions, and inhibit inappropriate actions may provide opportunities to exercise these capacities. However, the extent to which such opportunities translate into measurable improvements in focus and self-control requires empirical examination.

Traditional games offer a potentially valuable approach to incorporating these demands into elementary physical education. In Indonesia, games such as *gobak sodor*, *engklek*, *boy-boyan*, and *bentengan* combine physical movement, rule-based participation, and social interaction. Each game presents different behavioral challenges. *Gobak sodor* requires participants to monitor opponents, anticipate movement, and coordinate actions with teammates. *Engklek* involves maintaining balance, following movement sequences, and controlling body movements within defined spatial boundaries. *Boy-boyan* requires attention to the position of objects and other players, while *bentengan* involves tactical decisions, anticipation, and cooperation in pursuit of a shared objective. These characteristics provide plausible opportunities for students to practice attentional control, behavioral inhibition, decision-making, and emotional regulation. Nevertheless, the potential of these games to stimulate skills should not be interpreted as conclusive evidence that they improve those skills.

Evidence from research on physical activity and executive function provides a theoretical basis for investigating these possibilities. Donnelly et al. (2016), in a systematic review, examined the relationships among physical activity, physical fitness, cognitive function, and academic achievement in children. Their review highlighted the potential educational relevance of physical activity while recognizing that the evidence varies across outcomes and intervention characteristics. More recently, Mao et al. (2024) conducted a systematic review and meta-analysis of cognitively engaging physical activity interventions involving children and adolescents. Their findings indicated positive overall effects on executive function, including inhibitory control and working memory. Similarly, Zang et al. (2024) reported beneficial effects of aerobic exercise on children's executive function, although the included evidence was based on a limited number of studies. Together, these findings support the rationale for examining physical activities that combine movement with cognitive demands. However, they do not establish that traditional games necessarily produce the same effects, particularly when outcomes are measured through self-report or questionnaire-based assessments rather than direct cognitive-performance tasks.

Research specifically examining traditional games has also explored their potential contributions to children's behavioral development. Wardani and Nugrahanta (2021) investigated the contribution of traditional games to the development of self-control in children aged 9–12 years through the development and implementation of a traditional-game guidebook. Their findings provide a context-specific rationale for considering traditional games as a potential medium for supporting self-regulation. However, the study's development-oriented approach and limited implementation sample differ from a comparative evaluation of traditional game-based physical education and regular instruction. Fauzi et al. (2024) also investigated traditional games in elementary physical education, focusing on students' participation. This research supports the relevance of traditional games as a pedagogical strategy, but participation and self-control are different outcomes. Greater engagement in physical education does not necessarily demonstrate that students have developed stronger attentional or behavioral regulation. Consequently, these outcomes should be investigated separately rather than assumed to improve simultaneously.

An important methodological consideration is that improvement within an intervention group does not, by itself, demonstrate that an intervention is more effective than regular instruction. Changes in students' scores may reflect repeated exposure to learning activities, familiarity with assessment procedures, teacher support, or other experiences occurring during the research period. A comparison group helps address this issue by providing a reference for evaluating whether improvement exceeds that observed under regular learning conditions. Moreover, baseline differences between groups need to be considered because unequal starting scores may influence the interpretation of subsequent changes. A quasi-experimental pretest–post-test control-group design can therefore provide more informative evidence about the comparative outcomes of traditional game-based instruction, although it cannot eliminate all potential sources of bias associated with non-random assignment to conditions.

Despite the theoretical relevance of traditional games and the broader evidence concerning physical activity and cognitive development, further comparative investigation is warranted into their relationships with specific psychological and behavioral outcomes in elementary physical education. Focus and self-control should be analyzed independently because the cognitive demands associated with sustaining attention may differ from those involved in regulating behavior and emotional responses. Evaluating both outcomes within the same study can help clarify whether traditional game-based instruction is associated with additional improvements in one or both domains relative to regular physical education. This approach also allows conclusions to be based on between-group differences rather than relying exclusively on statistically significant pretest–posttest changes within the intervention group.

Accordingly, this study examined the effects of integrating four Indonesian traditional games—*gobak sodor*, *engklek*, *boy-boyan*, and *bentengan*—into physical education lessons for fifth-grade students at SD Negeri 1 Grogol, Diwek District, Jombang Regency, Indonesia. Using a quasi-experimental pretest–post-test control-group design, the study pursued two objectives: (1) to compare changes in students' focus between those participating in traditional game-based physical education and those receiving regular physical education, and (2) to compare changes in students' self-control between the two groups. It was hypothesized that the experimental group would demonstrate greater improvements in both outcomes than the control group. By examining between-group differences in change scores, the study sought to provide

empirical evidence regarding the potential added value of traditional games for supporting focus and self-control in elementary physical education.

METHODS

Research Design

This study employed a quantitative quasi-experimental design with a pretest–posttest control group to examine the effects of traditional game-based physical education on elementary school students' focus and self-control. The experimental group participated in physical education lessons incorporating four traditional Indonesian games, whereas the control group received regular physical education instruction without the structured integration of these games. Both groups completed the same outcome assessments before and after the intervention.

The study design enabled comparisons of changes in focus and self-control within each group and between groups. Because the allocation of participants to the experimental conditions followed the existing school learning arrangement rather than individual random assignment, the study was classified as quasi-experimental. Consequently, the findings were interpreted as evidence of comparative intervention outcomes rather than definitive causal effects.

Participants and Research Setting

The study was conducted at SD Negeri 1 Grogol, Diwek District, Jombang Regency, East Java, Indonesia. The target population consisted of 130 fifth-grade elementary school students. A total of 60 students were included in the final analysis, comprising 30 students in the experimental group and 30 students in the control group.

Participants were selected using simple random sampling from the target population. However, assignment to the experimental and control conditions followed the existing school learning arrangement to facilitate implementation within regular physical education lessons. Thus, random sampling was used to select participants, whereas allocation to the study conditions was not fully randomized. This distinction is important because pre-existing differences between groups may have influenced the observed outcomes.

All 60 participants had complete pretest and posttest data, and no missing observations were identified in the analyzed dataset. The study focused on fifth-grade students because the learning activities and game rules were intended to be implemented within the context of elementary school physical education.

Intervention and Research Procedures

The experimental group participated in physical education lessons incorporating four traditional Indonesian games: *gobak sodor*, *engklek*, *boy-boyan*, and *bentengan*. These games were selected because their rules and movement demands involve maintaining attention, responding to changing situations, making decisions, coordinating movements, cooperating with peers, and regulating behavioral and emotional responses.

The intervention was implemented during the school's scheduled physical education lessons. Each session generally consisted of five stages: (1) introductory activities and warm-up exercises, (2) explanation of the learning objectives and game rules, (3) implementation of the main game activities, (4) brief reflection on students' participation and behavior during gameplay, and (5) cooling-down activities. The reflection component was intended to encourage students to consider their adherence to rules, attention to the activity, interactions with peers, and behavioral responses during play.

The control group participated in regular physical education lessons without the structured implementation of the four traditional games. Both groups continued their learning activities within the school environment.

The intervention was designed to incorporate the traditional games into routine physical education rather than implement them as activities separate from the school curriculum. Nevertheless, the available research records did not specify the total intervention duration, the exact number of sessions, the duration of each session, or the frequency of implementation. These details should be added from the original research records before publication to improve reproducibility and enable readers to evaluate the intervention dose.

Research Instruments

Students' focus was assessed using a 20-item questionnaire with a four-point Likert response scale. The questionnaire included positively and negatively worded statements addressing cognitive and emotional engagement, maintenance of attention, resistance to distraction, learning enthusiasm, and persistence of concentration. The focus indicators were adapted from Haryadi (2017).

The questionnaire was administered before and after the intervention to assess changes in students' reported focus. Higher total scores were interpreted as indicating higher levels of focus, subject to the instrument's scoring procedures. Because the questionnaire contained both positive and negative statements, the scoring protocol should specify whether negatively worded items were reverse scored before total scores were calculated.

Self-control was assessed using a 32-item questionnaire with a four-point Likert response scale. The instrument covered four dimensions: cognitive control, behavioral control, emotional regulation, and decision-making. The instrument was based on references reported by Hadi (2025) and Prastyo (2024).

The questionnaire was administered to both groups at pretest and posttest. Higher total scores were interpreted as indicating greater self-control, provided that the scoring direction of all items was consistent. The use of the same questionnaire format at both assessment points allowed changes in students' scores to be examined over the research period.

The available documentation indicated that the questionnaire items were reviewed for their suitability to the intended indicators and that the same measurement format was used at pretest and posttest. However, item-level validity coefficients, evidence of construct validity, and internal consistency estimates, such as Cronbach's alpha, were not available in the research records.

Accordingly, no unverified validity or reliability coefficients were reported. The absence of these statistics limits the extent to which the measurement properties of the instruments can be evaluated. Furthermore, because both outcomes were assessed using questionnaires, the results represent questionnaire-based assessments of focus and self-control rather than direct measures of attentional performance or experimentally assessed inhibitory control.

Data Collection

Data collection involved two assessment occasions: pretest and posttest. Before the intervention, participants in both groups completed the focus and self-control questionnaires.

Following the intervention period, the same instruments were administered again to assess changes in the two outcomes.

Responses were compiled into a dataset containing participants' group membership and pretest and posttest scores for each outcome. Participant identities were replaced with identification codes during data processing, and results were summarized at the group level. The final dataset included 60 participants, with 30 in each group and complete observations for both outcomes at both assessment points. Change scores were calculated for each participant by subtracting the pretest score from the post-test score. Positive change scores therefore represented increases in questionnaire scores over time.

Statistical Analysis

Statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics included means, standard deviations, minimum and maximum scores, and mean change scores for focus and self-control in each group. The Shapiro–Wilk test and graphical examination of score distributions were used to assess the normality of pretest and post-test scores. Homogeneity of variance for between-group comparisons of change scores was examined using Levene's test. The results indicated that the homogeneity assumption was satisfied for focus change scores ($p = .172$) and self-control change scores ($p = .637$).

Within-group changes from pretest to post-test were examined using paired-samples t-tests. These analyses assessed whether mean scores changed significantly over the research period in each group. However, statistical significance within a group was not interpreted as sufficient evidence of intervention effectiveness because changes could also occur under regular physical education instruction.

To evaluate differences in improvement between groups, individual change scores were compared using independent-samples t-tests. For each outcome, the mean change in the control group was subtracted from the mean change in the experimental group. A positive between-group difference therefore indicated greater mean improvement in the experimental group.

Between-group effect sizes were expressed as Cohen's d, with 95% confidence intervals reported for mean differences where available. Statistical significance was evaluated using two-tailed tests with an alpha level of .05.

The available normality results showed that most pretest and posttest score distributions met the conventional normality criterion. However, the control group's posttest focusses scores deviated from normality ($p = .015$). Specific Shapiro–Wilk results for change scores were not available. Consequently, the parametric findings were interpreted cautiously, considering the sample size, distributional evidence, variance homogeneity, effect sizes, and confidence intervals.

Baseline differences between the groups were also considered when interpreting the findings. The experimental group had a significantly lower mean pretest focus score than the control group, whereas the baseline difference in self-control was not statistically significant. Because the primary between-group analysis compared change scores, these initial differences remain relevant to interpretation. An analysis of covariance (ANCOVA), using posttest scores as outcomes and corresponding pretest scores as covariates, may provide a complementary

analysis if the participant-level data are available and the relevant model assumptions are satisfied.

Ethical Considerations

The study was conducted in a school-based physical education setting and involved participation in physical activities and completion of questionnaires. Research implementation was coordinated with the school authorities, and participant identities were protected using identification codes during data processing. Results were reported in aggregated form to reduce the risk of identifying individual students.

The available research documentation did not contain a verifiable research ethics committee approval number or detailed records of written parental or guardian consent. Therefore, no formal ethics approval number or specific consent procedure is claimed in this manuscript. Because the participants were minors, the authors should verify the applicable institutional and school requirements, including parental or guardian consent and children's assent, before submitting the manuscript. Any ethics approval or consent statement included in the final article must accurately reflect the procedures that were actually completed and documented.

RESULTS

The analysis involved 60 students, with no missing data identified. The experimental and control groups each consisted of 30 students. Descriptive analysis showed increases in both focus and self-control scores in both groups. Detailed mean scores, standard deviations, score ranges, and average changes are presented in Table 1.

Table 1. Summary statistics of focus and self-control scores by group

Variable	Group	Pretest M ± SD (Min-Max)	Posttest M ± SD (Min-Max)	Change M ± SD
Focus	Experimental	37.50 ± 1.548 (35–40)	50.73 ± 1.680 (48–54)	13.23 ± 2.315
Focus	Control	39.07 ± 2.778 (32–43)	51.50 ± 1.737 (49–54)	12.43 ± 2.897
Self-control	Experimental	54.30 ± 1.601 (51–58)	83.77 ± 1.716 (80–87)	29.47 ± 2.063
Self-control	Control	54.93 ± 1.701 (52–58)	82.93 ± 1.856 (79–87)	28.00 ± 2.573

The Shapiro-Wilk test indicated that focus scores in the experimental group met the normality assumption for pretest ($p = 0.057$) and posttest ($p = 0.140$). In the control group, the pretest scores showed normal distribution ($p = 0.099$), whereas the posttest scores deviated from normality ($p = 0.015$). All self-control pretest and posttest scores met the normality criterion, with p-values ranging from 0.137 to 0.474. Since normality testing for change scores was unavailable, inferential findings were interpreted cautiously by considering effect sizes and confidence intervals.

Table 2. Changes in focus and self-control within each group

Variable	Group	Change M	95% CI	t(df)	p
Focus	Experimental	13.233	12.369–14.098	31.315 (29)	<.001
Focus	Control	12.433	11.352–13.515	23.508 (29)	<.001
Self-control	Experimental	29.467	28.696–30.237	78.220 (29)	<.001
Self-control	Control	28.000	27.039–28.961	59.603 (29)	<.001

The paired-samples t-test demonstrated significant increases in focus and self-control within both the experimental and control groups, with all p-values below .001. These findings indicate that changes occurred during the research period; however, they do not independently confirm that all improvements resulted from the traditional game intervention. Therefore, the effectiveness of the intervention was primarily evaluated through comparisons of change scores between groups.

Table 3. Comparison of change scores between experimental and control groups

Variable	Experimental Change	Control Change	Difference	95% CI Difference	t(df); p	Cohen's d
Focus	13.233	12.433	.800	-.555–2.155	1.182 (58); .242	.305
Self-control	29.467	28.000	1.467	0.261–2.672	2.436 (58); .018	.629

The comparison of change scores showed different patterns between focus and self-control. For focus, the improvement difference between the experimental and control groups was 0.800 points and was not statistically significant, t(58) = 1.182, p = .242. The Cohen's d value of 0.305 indicated a small effect size. Therefore, the hypothesis stating that traditional games would produce greater improvement in focus was not statistically supported.

For self-control, the experimental group demonstrated a greater improvement of 1.467 points compared with the control group. This difference was statistically significant, t(58) = 2.436, p = .018, with a Cohen's d value of 0.629, indicating a moderate effect size. Thus, the hypothesis regarding the improvement of self-control through traditional games was supported.

At baseline, the mean focus score of the experimental group was significantly lower than that of the control group, t (45.423) = -2.698, p = .010. Conversely, the initial difference in self-control scores was not statistically significant, t (58) = -1.485, p = .143. The analysis of change scores was therefore applied to evaluate development within each group while considering initial conditions. Nevertheless, future studies using analysis of covariance (ANCOVA) may provide stronger estimates by statistically controlling baseline differences.

DISCUSSION

Traditional Games in Physical Education

Physical activity can support children's cognitive and behavioral development. Executive functions include inhibitory control, attention regulation, and the ability to manage goal-directed behavior (Diamond, 2013). Previous studies have also discussed the relationship between physical activity, executive function, and academic achievement in children (Best, 2010; Donnelly et al., 2016; Tomporowski et al., 2008). However, the benefits of physical activity may depend on the type of activity and its cognitive demands. Mao et al. (2024) and Wei et al. (2024) highlighted the potential benefits of cognitively engaging physical activities for children's executive functions. Pesce (2012) also emphasized the importance of considering movement complexity and cognitive engagement when designing physical activity programs. Similarly, Lubans et al. (2016) discussed the cognitive, behavioral, and psychosocial mechanisms that may connect physical activity with children's health and development.

Traditional Indonesian games may provide opportunities to combine movement, attention, decision-making, and social interaction. *Gobak sodor* and *bentengan* require players to monitor their surroundings and respond to changing situations. *Boy-boyan* involves

coordination and interaction, while *engklek* requires movement control and adherence to rules. These activities may create meaningful learning experiences when teachers connect gameplay with specific educational objectives. Nevertheless, participating in games does not automatically develop every cognitive skill. Learning outcomes may depend on instructional methods, practice opportunities, teacher feedback, and reflection. Therefore, teachers should clearly communicate learning objectives and guide students in recognizing behaviors such as maintaining attention, following rules, and managing their responses.

Traditional Games and Self-Regulation

Traditional games can provide opportunities for children to practice self-regulation. During gameplay, students may need to wait for their turns, follow rules, cooperate with teammates, manage frustration, and make decisions. These activities are related to inhibitory control and other executive functions that support children's behavioral regulation (Diamond, 2013; Diamond & Lee, 2011). Wardani and Nugrahanta (2021) examined the use of traditional games to support self-control among children aged 9–12 years. Their work provides a relevant foundation for considering traditional games as learning activities that encourage behavioral regulation. Traditional games also contain cultural and educational values. Prasetyo et al. (2025) explored the cultural heritage and educational values of *meong-meongan*, while Pujasari et al. (2025) examined the practices and preservation of *metembing*. These studies highlight the potential of traditional games to communicate values such as cooperation, honesty, discipline, and sportsmanship.

However, cultural values should not be treated as direct evidence of psychological improvement. Ethnographic studies help explain the educational meaning of traditional games, whereas intervention studies are needed to evaluate their effects on specific student outcomes. Both perspectives can contribute to a better understanding of traditional games in physical education.

Pedagogical Implications

Game-based learning offers opportunities to combine physical movement, problem-solving, cooperation, and rule-following. Sumarjono et al. (2024) explored game-based learning media for long-jump instruction, while Junianti et al. (2026) examined a board-game-based physical education medium intended to support elementary students' physical literacy. These studies illustrate different ways of incorporating games into physical education. Traditional games may also help preserve local cultural heritage while supporting meaningful learning experiences (Prasetyo et al., 2025; Pujasari et al., 2025). Teachers can strengthen their educational value by connecting gameplay with clear behavioral objectives. For example, students can be encouraged to identify situations in which they need to wait, control impulsive responses, adapt decisions, or cooperate with others.

Brief reflection sessions and constructive feedback may help students recognize these behaviors. Teachers can discuss how students respond to rules, handle disagreements, and manage emotions during activities. Such strategies make self-regulation an explicit learning objective rather than if it develops automatically through gameplay. Nevertheless, the contribution of each instructional component needs further investigation. Traditional games involve physical activity, social interaction, rules, and teacher guidance. Future research could examine whether combining gameplay with explicit self-regulation instruction produces additional educational benefits.

Methodological Considerations and Future Research

Future studies should use rigorous research designs and clearly document intervention procedures. Information about session frequency, duration, activity intensity, instructional methods, and implementation fidelity is essential for replication and comparison with other studies. These details are particularly important because intervention characteristics may influence cognitive outcomes (Mao et al., 2024; Wei et al., 2024).

Researchers should also establish the validity and reliability of measurement instruments. Questionnaires may be complemented by behavioral observations, teacher assessments, and validated performance-based measures to provide a more comprehensive understanding of students' attention and self-regulation. Baseline differences and other potential confounding factors should be considered during data analysis. Depending on the design and assumptions, researchers may use analysis of covariance or appropriate longitudinal models. Studies involving multiple schools and more diverse participants would also help establish the broader applicability of the findings.

In addition, follow-up assessments could examine whether changes in students' behavior are maintained over time and transferred to other learning situations. Further research could also investigate how traditional games interact with teacher feedback, structured reflection, and explicit instruction in self-regulation. Overall, traditional games offer a culturally meaningful approach to elementary physical education. Their educational value may extend beyond physical skills by providing opportunities to practice attention, decision-making, cooperation, and behavioral regulation. However, the effectiveness of these activities should be evaluated according to specific learning objectives and supported by rigorous research.

CONCLUSION

This study examined the effects of integrating traditional Indonesian games into physical education on focus and self-control among fifth-grade elementary school students. The findings revealed that both the experimental and control groups experienced significant improvements in both outcomes. However, the between-group comparison showed that the traditional game-based intervention did not produce a statistically significant additional improvement in focus ($p = .242$, Cohen's $d = 0.305$). In contrast, the experimental group demonstrated significantly greater improvement in self-control than the control group ($p = .018$, Cohen's $d = 0.629$), with a moderate effect size. These findings suggest that incorporating *gobak sodor*, *engklek*, *boy-boyan*, and *bentengan* into physical education may provide additional benefits for students' self-control, although its added effect on focus was not statistically established.

The findings have practical implications for elementary physical education teachers. Traditional games may serve as culturally relevant learning activities that provide opportunities for students to practice following rules, regulating behavioral responses, making decisions, and cooperating with peers. Nevertheless, the results should be interpreted cautiously because the study employed a quasi-experimental design, the groups differed significantly in baseline focus scores, and the measurement instruments lacked documented validity and reliability coefficients. Accordingly, the findings do not establish definitive causal effects or demonstrate that traditional games are superior to regular physical education across all outcomes.

Future research should employ randomized or more rigorous quasi-experimental designs involving larger samples from multiple schools to improve the generalizability of the findings. Studies should also document intervention duration, session frequency, implementation fidelity, and instructional procedures in sufficient detail to support replication. The psychometric properties of the focus and self-control instruments should be established, and questionnaire assessments should be complemented by behavioral observations, teacher ratings, or validated performance-based measures. Furthermore, future studies should use baseline-adjusted analyses, such as analysis of covariance, when appropriate, and include follow-up assessments to determine whether improvements are maintained over time. Research could also investigate whether combining traditional games with explicit self-regulation instruction, structured reflection, and teacher feedback produces stronger outcomes than gameplay alone. Such investigations would help clarify the mechanisms through which traditional games may support children's behavioral regulation and determine the conditions under which they can be most effectively integrated into elementary physical education.

ETHICAL STATEMENT

This study was conducted within a school-based physical education learning environment using non-invasive procedures involving physical activities and questionnaire completion. The research implementation followed applicable administrative procedures established by the school. Participant identities were protected through coding procedures, and all findings were reported in aggregated form. The available research documentation did not include a formal ethical clearance number. Therefore, no ethical approval certificate number is reported in this article.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest in this research.

AUTHOR CONTRIBUTIONS

NNS: Conceptualization, data collection, data analysis, and writing – original draft. ZWH: Supervision, methodological review, interpretation of findings, and writing – review and editing. All authors reviewed and approved the final version of the manuscript.

AI DISCLOSURE STATEMENT

The authors used AI-based tools, namely ChatGPT and Grammarly, for language editing, structural improvement, and readability checking. All scientific content, data analysis, interpretation of findings, citations, and conclusions were reviewed and validated by the authors. The authors take full responsibility for the accuracy and integrity of the article content.

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