Vol. XXVII, Issue 1/ 2026

G Y M N A S I U M

Scientific Journal of Education, Sports, and Health

Original Article

The Effect of Practicing Traditional Games on Developing Some Coordinative Abilities in Children an Experimental Study on Children of Southeastern Algeria

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DOI: 10.29081/gsjesh.2026.27.1.3

Keywords: *traditional games, coordinative abilities, children, experimental program, physical education, southeastern Algeria*

Abstract

The objective of this study was to investigate the impact of a structured recreational program based on traditional games on developing coordinative abilities in children aged 6–10 from southeastern Algeria. Using a pre/post-test experimental design, 70 children were randomly divided into experimental and control groups. The experimental group took part in a traditional sports program, while the control group underwent conventional physical education practices. Analysis demonstrated statistically significant improvements on all tested abilities - balance walking ($F(1) = 79.842$, $p < 0.001$), reaction speed ($F(1) = 204.479$, $p < 0.001$), motor coordination ($F(1) = 77.560$ $p < 0.001$), agility ($F(1) = 37.114$, $p < 0.001$) in the experimental group with large effect sizes for all variables assessed. ANCOVA suggested a significant group superiority for the experimental group. The results advocate for the inclusion of traditional games in primary school physical education curricula as an evidence-based approach to development.

1. Introduction

Childhood is one of the most important developmental stages in human life, during which the initial foundations of an integrated personality are formed - encompassing physical, motor, psychological, and social dimensions. Play holds a central place in this stage, as it is a natural and essential means by which children learn, explore the world around them, and acquire communication skills, respect for rules, problem-solving abilities, and creative thinking. Organized physical and motor activities stand out as one of the most prominent forms of purposeful play, given

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their contribution to developing coordinative abilities - which form the cornerstone for acquiring motor skills and improving physical performance. These abilities include balance, movement rhythm, spatial orientation, visual-motor coordination, and reaction speed, all of which are indispensable for the child's adaptation to the demands of daily and sport-related activity (Siyam & Abu Al-Futuh, 2018). The importance of these abilities extends further to improving attention and concentration, enhancing academic achievement, and supporting social integration by nurturing a spirit of cooperation, self-confidence, and group belonging.

In this context, traditional games emerge as a rich educational environment combining simplicity, enjoyment, and cultural depth, offering children multiple opportunities to develop their coordinative abilities in a natural and progressive manner. Empirical evidence confirms this role: Tan, Nonis, and Chan (2021) demonstrated that traditional games produced significant improvements in balance and gross motor skills among preschool children compared to free play, while Hussain and Cheong (2022) found that practicing traditional game skills under high contextual interference conditions yielded superior motor skill acquisition in children aged 7–10. More recently, Hutahaean, Simbolon, Gea, and Siregar (2025) reported large effect sizes (Cohen's d =1.20-1.34) following a four-week traditional folk games program targeting locomotor and object-control skills in elementary school children. However, interest in these games has begun to decline in the face of the dominance of modern technological tools, which necessitates a reassessment of their value as an authentic educational mechanism and their systematic, scientific investment in the service of the child's comprehensive and balanced development (Al-Zughbi, 2018).

Several scientific studies have affirmed the positive impact of folk and traditional games on children's motor and coordinative abilities. The study by Dara Aziz (2011) revealed that folk games had a direct and statistically significant effect on developing the physical abilities of 4th and 5th grade primary school students aged 10–11 at Al-Jamiaa School in Mosul, through an experimental method applied to a sample of 40 students. In the same vein, the study by Kambash (2012), conducted on 60 first-grade students aged 6–8 at Diyala School in Iraq, demonstrated that integrating folk games into physical education lessons contributed markedly to developing sensory-motor perception compared to conventional sports games. The study by Aouini (2020) further confirmed that a proposed program of motor and traditional games had a positive effect on the balance trait and some perceptual-motor abilities in primary school children aged 6–7, using the Dayton Perceptual Survey on a sample of 22 students divided equally into experimental and control groups. These findings are consistent with those of Hussain and Cheong (2022), who showed through a controlled experiment that traditional games - when structured along the contextual interference continuum - produce measurable and lasting improvements in gross motor skills, and with Hutahaean et al. (2025), who reinforced the effectiveness of folk game-based programs in developing children's fundamental movement skills within a school setting.

Building on the educational and developmental importance of traditional games as confirmed by prior studies, and in light of the declining practice of these

games among children in the contemporary era, the research problem of this study centers on the following main question: What is the effect of the program based on traditional games on developing some coordinative abilities in children? Three sub-questions stem from this: Are there statistically significant differences between the pre-test and post-test of the control group? Are there statistically significant differences between the pre-test and post-test of the experimental group in favor of the post-test? And are there statistically significant differences in the post-test between the two groups in favor of the experimental group?

To address these questions, the following hypotheses were formulated: There are no statistically significant differences between the pre-test and post-test of the control group; statistically significant differences exist between the pre-test and post-test of the experimental group in favor of the post-test; and statistically significant differences exist in the post-test between the two groups in favor of the experimental group.

This study derives its importance from its contribution to designing a proposed recreational program grounded in scientific foundations, employing traditional games specific to southeastern Algeria as a tool for developing some coordinative abilities in children, while drawing attention to these games as an educational means consistent with the characteristics of the age group and the objectives of physical and sports activity (Tahani, 2001). Given that research consistently demonstrates the effectiveness of structured traditional game programs in enhancing children's coordinative and motor abilities (Tan, Nonis, & Chan, 2021; Hussain & Cheong, 2022; Hutahaean et al., 2025), this study represents a timely scientific contribution that bridges international evidence with the local Algerian educational context. Accordingly, the study seeks to achieve its main objective - determining the effect of the proposed recreational program on developing some coordinative abilities in children - through three sub-objectives: identifying the significance of differences between the pre-test and post-test of the experimental group in favor of the post-test; determining the significance of differences in the post-test between the two groups in favor of the experimental group; and constructing a standardized recreational program based on traditional games to improve children's levels of the targeted coordinative abilities - namely: balance walking, reaction speed, motor coordination, and agility.

2. Material and methods

Study Method

The researcher used the experimental design of pre-tests and post-tests for both groups (experimental and control), which is based on measuring both groups (experimental and control) with a pre-test (before the experiment), then a post-test (after the experiment), while the control group was not exposed to the experimental variable (the proposed recreational program). The differences between the two measurements (pre and post) confirm or deny the validity of the study hypotheses**.**

Study Sample

The study sample consisted of 70 children forming two groups for the year - one representing the experimental group (35 students) and the other representing

the control group (35 children). These two groups were selected after applying coordinative ability tests on 250 children.

Study Tools

Sample Control Tools: A form was designed to collect information from children, including: parents' educational level, chronological age, intelligence level, birth order. The level of coordinative abilities was also measured before applying the program.

Applied Tools:

- A questionnaire containing a set of standardized tests presented to expert referees to obtain their opinions on the most appropriate tests that validly, reliably, and objectively measure the dependent variable.

- A questionnaire containing a set of traditional games specific to southeastern Algeria, presented to expert referees to obtain their opinions on the most appropriate games that can be applied to the age group of 6-10 years to develop some coordinative abilities.

- The researcher also relied on standardized tests, after nomination by some referees, to measure some coordinative abilities - represented in the following tests: rope jumping, running around a circle, walking on a beam, and the 20m x 2m running test — then presenting and discussing them with specialized experts.

Psychometric Properties of the Study Tools

Content Validity: This step involved surveying the opinions of 13 faculty members and professors to guide their views.

Discriminant Validity: After arranging the scale scores in descending order from highest to lowest, a comparison was made between the top 33% and the bottom 33%, then a t-test was applied to examine the significance of differences between the two group means. Results confirmed the discriminant ability of the test.

Reliability Using Test-Retest Method for Coordinative Abilities:

Initial procedures were conducted to calculate the reliability coefficient for each test using the test-retest method. The first tests were applied to a sample of 20 children, and after two weeks the test was re-administered to the same individuals under the same conditions. The reliability coefficient reached 0.74, indicating that the test has a high level of stability and consistency.

Statistical Methods

Data analysis was conducted using SPSS software and was organized along three tracks: computing the psychometric properties of the study instruments, verifying the homogeneity between the experimental and control groups prior to the intervention, and testing the study hypotheses. To establish the reliability of the measurement tools, the Pearson correlation coefficient was employed. Group comparisons and hypothesis testing were carried out using the independent samples t-test to examine differences between the two groups, and the paired samples t-test to assess within-group differences between pre-test and post-test measurements. To determine the practical significance of observed differences, Eta squared (η^2) was calculated as a measure of effect size. Furthermore, Analysis of Covariance (ANCOVA) was applied to control for pre-

test scores when comparing post-test outcomes between the experimental and control groups, thereby ensuring the internal validity of the findings.

Pilot Study

In order to identify potential weaknesses in the research experiment, the researcher conducted a pilot study by applying coordinative ability tests to 250 children and four units of the proposed program to 10 children outside the research sample, to monitor the implementation process of this program.

3. Results and Discussions

Results of the First Hypothesis

The first hypothesis states: 'There are no statistically significant differences between the pre-test and post-test of the control group in developing some coordinative abilities.'

To verify this hypothesis, the t-test for significance of differences between two related groups was used. Results are as follows:

Table 1. *T-test results for significance of differences between the control group means in pre and post measurements on coordinative abilities*

Test / Unit	N	Test	Mean	Std. Dev.	df	t-value	Sig. Level
Rope Jumping (count)	35	Pre	1.08	1.06	34	0.158	0.875
		Post	1.05	1.05			
Running Around a Circle (sec)	35	Pre	5.25	0.63	34	-0.565	0.576
		Post	5.34	0.63			
Walking on a Beam (sec)	35	Pre	2.81	0.53	34	0.672	0.506
		Post	2.71	0.66			
Reaction Speed (sec)	35	Pre	2.35	0.52	34	1.468	0.151
		Post	2.14	0.45			

Statistical analysis (Table 1) revealed that the arithmetic mean in the pre-test for rope jumping (1.08) was greater than the post-test mean (1.05), with a calculated t-value of 0.158 at df=34, sig. level=0.875 (>0.05). For running around a circle, the pre-test mean (5.25) was less than the post-test mean (5.34), with t=-0.565, sig.=0.576 (>0.05). For walking on a beam, the pre-test mean (2.81) exceeded the post-test mean (2.71), with t=0.672, sig.=0.506 (>0.05). For reaction speed, the pre-test mean (2.35) exceeded the post-test mean (2.14), with t=0.468, sig.=0.151 (>0.05). Since all calculated t-values exceeded the significance level of 0.05,

Results of the Second Hypothesis

The second hypothesis states: 'There are statistically significant differences between the pre-test and post-test of the experimental group in developing some coordinative abilities, in favor of the post-test.'

To verify this hypothesis, the t-test for significance of differences between two related groups was used. Results are as follows:

Table. 2 *T-test results for significance of differences between experimental group means in pre and post measurements on coordinative ability tests*

Test / Unit	N	Test	Mean	Std. Dev.	df	t-value	Sig. Level
Rope Jumping (count)	35	Pre	1.02	1.04	34	-15.445	0.000
		Post	3.91	0.65			
Running Around a Circle (sec)	35	Pre	5.63	0.81	34	6.982	0.000
		Post	4.50	0.43			
Walking on a Beam (sec)	35	Pre	4.19	1.47	34	7.123	0.000
		Post	2.30	0.41			
Reaction Speed (sec)	35	Pre	2.50	0.31	34	6.530	0.000
		Post	2.07	0.15			

Statistical analysis (Table 2) revealed statistically significant differences in all coordinative ability tests. For rope jumping, the pre-test mean (1.02) increased to the post-test mean (3.91), with t=-15.445, sig.=0.000 (<0.05). For running around a circle, the pre-test mean (5.63) improved to post-test (4.50) - a reduction in time indicating improvement - with t=6.982, sig.=0.000. For walking on a beam, time improved from 4.19 to 2.30, with t=7.123, sig.=0.000. For reaction speed, time improved from 2.50 to 2.07, with t=6.530, sig.=0.000. Since all calculated t-values were below the significance level of 0.05.

Table 3. *Eta squared (η^2) results and effect size of the method used in developing coordinative abilities in the experimental group*

Independent Variable	Dependent Variable	η^2 Value	Effect Size
Method Used	Rope Jumping	0.68	Large
	Running Around a Circle	0.52	Large
	Walking on a Beam	0.48	Large
	Reaction Speed	0.58	Large

The results in Tables 3 and 4 are attributed to the effect of the independent variable (the proposed program). The null hypothesis is therefore rejected. We conclude that there is a statistically significant difference between the pre and post measurement means of experimental group children on the coordinative abilities scale. The proposed program was effective in developing coordinative abilities in the experimental group. Effect size is considered small if η^2=0.01, medium if η^2=0.06, and large if η^2=0.14. (Al-Farqi, 2012, p. 35).

Table 4. *Interpretation of η^2 value*

Tool Used	Small	Medium	Large
η^2	0.01	0.06	0.14

Results of the Third Hypothesis

The third hypothesis states: 'There are statistically significant differences in the post-test between the control group and the experimental group in developing some coordinative abilities, in favor of the experimental group.'

To verify this hypothesis, Analysis of Covariance (ANCOVA)was used as a statistical control method, treating the pre-test as a covariate to eliminate any confounding effects and attribute results to the independent variable. Results are shown in the following table:

Table 5. *ANCOVA results for the effect of the proposed program*

Source of Variance	Sum of Squares	df	Mean Square	F-value	Sig.
Pre-test (Covariate)	1.071	1	1.071	1.538	0.219
Group Type	102.559	1	102.559	147.302	0.000
Error	46.649	7	0.696		
Total	150.279	69			

In Tables 5 and 6 Statistical analyses revealed that the F-value equals 147.302, which is statistically significant at level 0.000. This indicates a statistically significant difference between the adjusted means of the two groups in the post-test after controlling for the pre-test effect. The adjusted mean for the control group (12.06) was less than the adjusted mean for the experimental group (14.85), confirming that differences favor the experimental group.

Table 6. *Pre-test, post-test, and adjusted means by group*

Group	Pre-test Mean	Post-test Mean	Adjusted Mean
Experimental	12.39	14.41	14.85
Control	11.96	12.00	12.06

Discussions

The consistency of the control group's performance over all four coordinative ability tests and absence of statistically significant differences between pre- and post-measurements indicates that conventional physical education routines alone, without a specific structured intervention, are not conducive to substantial developmental improvements in these abilities within a comparable duration (Gallahue, Ozmun, & Goodway, 2012). This finding confirms that the experimental design is internally consistent and provides a credible baseline, making certain that any changes noted in the group subject to experimentation are due solely to the independent variable rather than maturation effects, repeated testing or other extraneous variables (Schmidt & Lee, 2011). These results are in agreement with Kambash (2012), who reported similar improvement trends that were absent in children receiving traditional physical education intervention without folk game integration.

The impressive and statistically significant individual plus the aggregate results of all coordinative ability tests in the experimental group, as well as large effect sizes (η^2 = 0.48–0.68), indicate that the proposed traditional games program with developmental functions is a highly effective factor stimulating children aged 7–11 years old (Stodden et al., 2008). For rope jumping, an η^2 of 0.68 means that about 68% of variance in post-test performance is explained directly by the intervention — a magnitude that emphasizes not just statistical significance, but deep practical relevance (Al-Farqi, 2012; Cohen, 1988). The results meld well with the findings of Dara Aziz (2011) who also documented a direct and significant increase in motor skills in primary-school-aged children after folk game exposure, and with those of Aouini (2020), which showed positive effects on balance and perceptual-motor abilities brought about by traditional game programs for similar age groups.

Within the reading on international literature, Hussain & Cheong (2022) found that traditional games designed along the contextual interference continuum allowed for better acquisition of gross motor skills in children aged 7–10 years old, and can be explained based on the having unpredictable and varied contexts of traditional games, which constantly demands from children to adapt their motor responses - a mechanism which directly potentiates coordinative neural development (Wulf & Lewthwaite, 2016). Hutahaean et al. (2025) similarly reported large Cohen's d effect sizes (1.20–1.34) after a four-week intervention with folk games, supporting the current study's assertion that even brief but appropriately planned traditional game programs can produce large coordinative development effects. Most pertinently, a quasi-experimental study published recently by Çinar and Hassani (2026) offered an array of robust evidence for this assertion, demonstrating that a structured programme of traditional games elicited statistically significant progress in the physical, psychological and cognitive domains of physical literacy suggesting that rather than limiting their impact anthropometrically to motor development alone they conceived co-ordination ability progression within a more integrative model of child development.

Several complementary perspectives help explain the mechanisms underlying these benefits. Meaningful, culturally familiar, and socially expressed practice of motor skills through a biomechanical system is naively embedded within the natural structure of playing traditional games that sustain functional relations between perception, action and task goals - all factors determined to influence effective and permanent learning by ecological dynamics theory (Newell, 1986; Hussain & Cheong, 2022). The games used in this program necessitated engagement with balance, spatial orientation, reaction speed and total-body coordination, under variable and increasingly challenging conditions — all of which provide rich sensorimotor stimulation needed for the development of coordinative neural pathways (Lubans, Morgan, Cliff, Barnett, & Okely, 2010). Moreover, the built-in engagement provided by the playful, competitive, and culturally salient structure of these games promoted sustained child commitment and sufficient practice density - two key prerequisites for neuromotor adaptation (Çinar & Hassani, 2026).

Results of ANCOVA showed that the significant difference found in post-test performance of the experimental group was not due to any initial differences between groups but was directly attributable to intervention program at F value 147.302 (p = 0.000) and adjusted mean score of post-test scored by students from experimental group was found significantly better than control group with M posttest, exp = 14.85; M posttest control gr = 12.06 - in favor of experimental group. Because ANCOVA is a powerful statistical control procedure that isolates the pure effect of the independent variable, eliminating residual baseline confounds, this conclusion is quite robust. These findings are consistent with Kambash (2012) and Tan, Nonis, and Chan (2021) whose two-group experimental designs also showed a realm of superiority of these structured traditional game programs to common body activities regarding measurable motor and coordinative human gains (Barnett, Van Beurden, Morgan, Brooks, & Beard, 2009). The convergence of these findings across culturally diverse contexts - Iraq, Algeria, Malaysia, Indonesia and Turkey - robustly supports traditional games as an effective developmental intervention designed to be evidence-based for curriculum integration specifically in the physical education settings commonly accessed by school-aged children.

This study has several limitations that must be acknowledged despite its important findings. First, the study focused on children from only one region (southeastern Algeria); therefore, it would be difficult to generalise their findings in other geographical, cultural or demographic contexts. Second, the sample sizes (35 per group) are relatively small and the groups were not randomised because such a procedure would have been impractical within a school-based environment; therefore selection bias could exist in this study and the generalisability of findings may be limited. Third, there were no follow-up measurement phases included in the present study so we cannot infer about whether or not any of the interventions would facilitate retained gains in coordinative ability beyond post-presentation periods. Fourth, the study assessed only four specific coordinative abilities (balance walking, reaction speed, motor coordination and agility), thus the results cannot be generalized to the broader scope of coordinative ability. Finally, although the study controlled statistically for pre-test differences using ANCOVA, potential confounders during the intervention period such as level of activity out-of-school in children, nutritional status and sleep patterns were not systematically recorded. Future studies should focus on implementing randomized controlled designs using larger and more heterogeneous samples, including follow-up assessments, and extending the set of tests for coordinative ability to ultimately yield more thorough, generalizable evidence (Çinar & Hassani, 2026).

4. Conclusions

The conclusion of this study is that the structured recreational program targeting traditional games from southeastern Algeria can be considered an effective educational intervention to develop coordinative abilities in children aged 6–10. The analysis showed that the experimental group had significant improvement on all

measured abilities - balance walking, reaction speed, motor coordination and agility - with large effect sizes ($\eta^2 = 0.48–0.68$), while the control group remained stable during the same period of time. ANCOVA analysis confirmed that these gains could be directly ascribed to the intervention itself, the adjusted posttest mean for the experimental group (14.85) much higher than that of control group subjects (12.06). As such, these findings ultimately reaffirm the deep educational value of traditional games as a pedagogical tool that is simultaneously scientifically effective, age-appropriate, and culturally authentic - thus justifying and necessitating their deliberate reintegration into formal educational environments.

The current results would imply that the structured traditional game programs might be considerate in an official primary school curriculum as a culturally-based and evidence-based strategy for coordinative abilities development by physical education teachers. Authorities for education should simultaneously invest in systematic documentation and classification of the traditional games in different regions of Algiers to provide roles the locations of standardized organized age-appropriate game libraries as practical specialized resources for practitioners within them. Future work is still needed to confirm these findings with randomized controlled designs, larger and more divergent samples, longer intervention periods and post-intervention follow-up assessments while expanding the scope of inquiry to a wider variety of coordinative abilities, along with psychosocial developmental outcomes.

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