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CHANGES IN BASIC RUNNING SKILLS AFTER A BENTENGAN TRADITIONAL-GAME PROGRAM

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Abstract

This study quantified changes in basic running-skill scores among third-grade pupils after 16 physical-education lessons incorporating the Indonesian traditional game Bentengan. A one-group pretest–posttest design involved all 15 pupils in one class at MI NW Lingkung. A rubric assessed acceleration, movement coordination, and lower-limb explosive performance before and after the program. Paired scores were compared using a paired-samples *t* test. Mean scores increased from 44.79 ± 4.83 to 59.91 ± 5.92 . The mean increase was 15.13 points (95% CI 12.32–17.95), $t(14)=11.542$, $p<.001$, with a large paired effect ($d_n=2.98$). Running-skill scores improved during the 16-lesson Bentengan program. Because one class was assessed without a control group and the outcome rubric was incompletely documented, the improvement cannot be attributed exclusively to the game.

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INTRODUCTION

Fundamental movement skills provide a foundation for children's participation in physical activity, games, and sport. Running is a central locomotor skill and supports later performance in athletics, invasion games, and daily play. Global evidence indicates substantial scope for improvement in childhood motor competence, while movement proficiency is positively associated with physical activity (Bolger et al., 2021; Dobell et al., 2020; Xin et al., 2020). Elementary physical education therefore needs developmentally appropriate opportunities for frequent and varied practice

Traditional games can provide culturally meaningful movement experiences with minimal equipment. Bentengan is a team pursuit game in which players protect a base, chase opponents, escape tagging, change direction, and return rapidly to



safety. These actions repeatedly expose children to acceleration, deceleration, coordination, spatial awareness, and decision-making. Unlike isolated running drills, the movements occur in a social and goal-directed context that may sustain participation.

Indonesian studies generally report favorable motor outcomes after traditional-game programs. Supriadi (2019) found improvements in fundamental movement skills, Suherman et al. (2019) developed a traditional-game instructional model, and Yulianto et al. (2024) reported gains after a game-based physical-education intervention. Research using Hadangan and other traditional games has also shown improvements in gross motor performance (Bernhardin et al., 2023; Shodiq et al., 2025). However, many studies use small uncontrolled designs and aggregate motor outcomes rather than focusing on running-related performance.

At MI NW Lingkung, preliminary observation suggested that third-grade pupils needed more engaging opportunities to develop basic running skills. The present study therefore quantified change in a rubric-based running score after 16 lessons incorporating Bentengan. We expected post-program scores to exceed baseline scores, while recognizing that a one-group design can document change but cannot isolate a causal effect.

METHOD

Design, Setting, and Participants

A quantitative one-group pretest–posttest design was used at MI NW Lingkung, Kopang District, Central Lombok, from 1 to 30 June 2026. All 15 third-grade pupils enrolled in the class were included through total sampling. The source manuscript does not report age, sex, anthropometry, health status, eligibility criteria, attendance, parental consent, child assent, or ethics approval. These details should be supplied before submission.

Intervention

Bentengan was integrated into 16 physical-education lessons. Pupils worked in teams and performed repeated pursuit, evasion, base-defense, and return-to-base actions. The teacher and researcher monitored participation. The source record does not specify lesson duration, field dimensions, team size, rule modifications, work-to-rest structure, progression, teacher qualifications, safety procedures, attendance, or fidelity. These items are required for replication and should be recovered from lesson plans rather than inferred.

Outcome Measure

Basic running skills were scored before and after the program with a rubric covering acceleration, movement coordination, and lower-limb explosive performance. Observations and photographs documented lesson delivery. The

source manuscript does not identify the tasks used to elicit each indicator, scoring range, number of trials, assessor training, content-validity process, inter-rater reliability, or whether assessors were blinded. Consequently, the score should be treated as a study-specific composite rather than a validated universal running-skill measure.

Statistical Analysis

Means, standard deviations, and ranges summarized scores. The source analysis reported Shapiro–Wilk tests for pretest and posttest and a Levene test comparing their variances. For a paired t test, however, the relevant distributional assumption concerns within-pupil differences, and equality of pretest and posttest variances is not required. A paired-samples t test evaluated mean change at $\alpha=.05$. The standard deviation of change, 95% confidence interval, percentage increase, and $d_n=t/\sqrt{n}$ were reconstructed from the reported results (Lakens, 2013). Raw scores were unavailable for independent assumption checks.

RESULTS

All 15 pupils were included in the reported analysis. Mean score increased by 15.13 points, or 33.8% relative to baseline. The minimum increased from 37.10 to 49.90 and the maximum from 52.90 to 71.50 (Table 1). The manuscript states that almost all pupils improved, but participant-level data were unavailable to verify this pattern.

Table 1.
Basic running-skill scores

Measurement	n	Mean	SD	Minimum	Maximum
Pretest	15	44.79	4.83	37.10	52.90
Posttest	15	59.91	5.92	49.90	71.50

The reported Shapiro–Wilk values were $W=.950$, $p=.518$ for pretest and $W=.944$, $p=.453$ for posttest. The reported Levene test was $F(1,28)=0.417$, $p=.523$. Neither result verifies normality of the paired differences; the Levene test is unnecessary for a paired comparison.

Table 2.
Reported preliminary tests

Test	Data	Statistic	df	p
Shapiro–Wilk	Pretest	$W=.950$	15	.518
Shapiro–Wilk	Posttest	$W=.944$	15	.453
Levene	Pretest vs posttest	$F=.417$	1, 28	.523

The paired analysis indicated a statistically significant increase, $t(14)=11.542$, $p<.001$. The reconstructed mean increase was 15.13 points (95% CI 12.32–17.95), with a standard deviation of change of 5.08 and a large standardized paired effect, $d_n=2.98$ (Table 3).

Table 3.

Paired comparison of running-skill scores

Contrast	Mean increase	95% CI	SD change	t (df)	p	d_n
Posttest–pretest	15.13	12.32–17.95	5.08	11.542 (14)	<.001	2.98

DISCUSSION

Basic running-skill scores were substantially higher after pupils completed 16 Bentengan lessons. The 33.8% increase and large paired effect indicate a marked within-class change. Bentengan repeatedly required pupils to start, accelerate, pursue, evade, stop, turn, and return to a base, offering a plausible task-specific stimulus for the acceleration and coordination components of the rubric.

The direction of change is consistent with previous research. Supriadi (2019) reported improved fundamental movement skills after traditional-game activities, while Yulianto et al. (2024) found gains among first-grade pupils. Bernhardt et al. (2023) reported improved gross motor skills after 14 Hadangan sessions, and Shodiq et al. (2025) found favorable outcomes after integrating traditional games in elementary physical education. Recent reviews likewise conclude that culturally grounded games can support coordination, agility, balance, and strength, although the evidence often comes from small quasi-experimental studies (Riani et al., 2025; Yulianto et al., 2025).

A motor-learning explanation is plausible but cannot be confirmed from these data. Bentengan supplies repeated locomotor actions while allowing pupils to adjust speed and direction in response to other players. Variation and meaningful goals may promote engagement and adaptable movement solutions. Yet the rubric combined acceleration, coordination, and explosive performance into one score; without indicator-level results, it is not possible to determine which component changed most or whether the score reflects actual sprint performance.

The design requires cautious interpretation. There was no control class, so maturation, ordinary physical-education exposure, repeated assessment, teacher attention, or concurrent activity could have contributed. The same assessors may have known whether a score came from pretest or posttest. Intervention dosage and fidelity were not reported, and measurement validity and reliability were not



established. Moreover, normality should have been examined for paired differences, whereas the reported Levene test does not support the paired-test assumption.

For practice, Bentengan can complement structured locomotor instruction because it is inexpensive, social, and culturally familiar. Teachers should adapt field size, team numbers, pursuit periods, and rest to children's ability, ensure safe tagging and adequate space, and provide technical cues for posture, arm action, acceleration, and stopping. Games should not replace direct instruction when a specific running component requires focused feedback.

Future research should compare Bentengan with usual instruction or another active game, use larger samples across schools, and report attendance and implementation fidelity. Validated instruments such as process-oriented locomotor assessments, electronic sprint timing, change-of-direction tests, and indicator-level scores would clarify the nature of improvement. Follow-up testing would show whether gains persist beyond the immediate program.

CONCLUSION

Basic running-skill scores increased among 15 third-grade pupils during a 16-lesson Bentengan program. Mean improvement was 15.13 points (95% CI 12.32–17.95), $t(14)=11.542$, $p<.001$, $d_n=2.98$. Bentengan is a promising culturally relevant option for elementary physical education, but the uncontrolled design and incompletely documented measure prevent a definitive causal conclusion.

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