

Effects of a 12-Session Rounders Program on Motor Ability in Upper-Grade Elementary School Boys: A One-Group Pretest–Posttest Study

Asna Nauli Harahap^{1*}, Eka Abdurrahman², and Ramadan³

¹Sekolah Tinggi Olahraga dan Kesehatan Bina Guna, Medan, Indonesia

²Sekolah Tinggi Olahraga dan Kesehatan Bina Guna, Medan, Indonesia

³Sekolah Tinggi Olahraga dan Kesehatan Bina Guna, Medan, Indonesia

Corresponding Author: [asna@gmail.com]

Abstract

Objectives: This study examined whether a 12-session rounders program was associated with improved motor ability among male students in Grades IV–VI at SD Negeri 101778 Medan Estate.

Materials and Methods: A pre-experimental one-group pretest–posttest design was used. Participants were 25 male students: nine in Grade IV, eleven in Grade V, and five in Grade VI. The intervention comprised 12 one-hour rounders sessions. Motor ability was assessed before and after the program using a four-item school motor ability battery: 50-yard sprint, standing long jump, sit-and-reach, and baseball throw-and-catch. Item scores were converted to standardized scores and combined. A paired-samples t-test compared pretest and posttest scores.

Results: The mean composite score increased from 200.12 at pretest to 206.24 at posttest, an absolute gain of 6.12 points (3.06%). The paired comparison was statistically significant, $t(24) = 4.014$, $p < .001$, with a derived standardized paired effect of $d_r = 0.80$. At posttest, 10 students (40%) were classified as good, 9 (36%) as fair, 2 (8%) as poor, 4 (16%) as very poor, and none as excellent.

Conclusions: The 12-session rounders program was associated with a statistically significant, moderately large improvement in composite motor ability. Because no control group was included, the result should be interpreted as preliminary evidence rather than definitive causation. Controlled studies with complete protocol reporting are recommended.

Keywords: elementary school; fundamental movement skills; motor competence; physical education; rounders

Introduction

Motor competence supports children's participation in physical education, sport, active play, and everyday movement. It includes locomotor capacities such as running and jumping, object-control capacities such as throwing and catching, and stability or mobility qualities that allow movements to be performed efficiently. These foundations do not develop optimally through maturation alone; they are strengthened through instruction, practice, feedback, and varied opportunities to move. Systematic evidence links motor competence with physical activity and health-related fitness, making its development a central goal of elementary physical education.

Game-based learning is a promising context for motor development because it combines repetition with enjoyment, choice, interaction, and meaningful goals. A systematic review and meta-analysis of 12 randomized studies involving children aged 3–12 years found that sports-game interventions produced superior fundamental motor skill development compared with control conditions (Sun & Chen, 2024). A recent meta-analysis of school-based interventions similarly reported a positive overall effect on fundamental movement skills and suggested that duration, frequency, and program length influence outcomes (Yin et al., 2025). However, active-play evidence remains heterogeneous, and not all interventions improve every motor domain (Zhang et al., 2025).

Rounders is a striking-and-fielding game that naturally combines several movement demands. Batters strike and accelerate between bases; fielders sprint, stop, change direction, throw, and catch; and all players coordinate visual information with whole-body action. This combination can provide repeated exposure to speed, lower-limb power, flexibility, and hand–eye coordination. Research conducted with elementary-school students has shown significant improvement in fundamental movement skills after a 16-session striking-and-fielding games program that included

baseball, kippers, slag ball, and rounders (Karisman et al., 2020). Small-ball learning models also offer a practical way to connect motor and cognitive tasks in elementary physical education (Widodo et al., 2023).

At SD Negeri 101778 Medan Estate, teachers identified a need to strengthen the motor ability of upper-grade students. The school environment supported active movement, but informal activity alone did not ensure systematic exposure to coordinated running, jumping, flexibility, throwing, and catching tasks. A structured rounders program was therefore selected because it was accessible, enjoyable, and aligned with curriculum content. The study aimed to determine whether motor ability scores changed after 12 rounders sessions among male students in Grades IV–VI. It was hypothesized that posttest scores would be higher than pretest scores.

Materials and Methods

Study Design

This study used a pre-experimental one-group pretest–posttest design. One group was measured before and after a 12-session rounders program, with no concurrent control group. The design estimates within-participant change but cannot isolate the intervention from maturation, repeated testing, school activities, or other time-related influences. The study was conducted at SD Negeri 101778 Medan Estate, Deli Serdang Regency, North Sumatra, Indonesia.

Study Participants

The participants were all 25 male students identified in the source record from Grades IV, V, and VI: nine Grade IV students, eleven Grade V students, and five Grade VI students. The study therefore used total sampling of the eligible male population described by the school. Exact age, anthropometry, prior sport participation, health-screening criteria, attendance, and socioeconomic characteristics were not reported in the source manuscript and should be verified before submission.

Study Organization

Motor ability was measured at baseline. Students then participated in 12 rounders sessions, each lasting approximately 60 minutes, after which the same assessment battery was repeated. The source manuscript did not document session frequency, total intervention weeks, lesson progression, group size, field dimensions, equipment, instructor qualifications, attendance threshold, fidelity checks, or adverse-event monitoring. These details must be added from the original teaching plan to allow replication.

The intervention involved rounders as a striking-and-fielding activity in which students practiced batting, running between bases, fielding, throwing, catching, and game decisions. For a developmentally appropriate program, these tasks should progress from isolated familiarization to paired practice and modified games, with ball size, distance, field dimensions, and rules adjusted to student ability.

Motor Ability Assessment

The school motor ability battery comprised four tests: a 50-yard sprint for speed, standing long jump for lower-limb explosive power, sit-and-reach for flexibility, and baseball throw-and-catch for object-control coordination. Raw values from different measurement scales were converted to standardized scores and summed into a composite motor ability score. The archived manuscript did not specify trial numbers, scoring direction, equipment calibration, reliability, standardization equations, or the full normative reference. The authors should restore these details from the original manual before submission.

Statistical Analysis

Descriptive statistics were calculated for composite scores. Pretest and posttest means were compared using a two-tailed paired-samples *t*-test with $\alpha = .05$. The reported *t* statistic and sample size yield 24 degrees of freedom. A standardized paired effect was derived as $d_r = t/\sqrt{n}$; this calculation gives 0.80. The percentage change was calculated as $[(\text{posttest mean} - \text{pretest mean})/\text{pretest mean}] \times 100$. Posttest scores were also classified using five intervals: excellent (>248.02), good (>220.17 to 248.02), fair (>192.32 to 220.17), poor (>164.47 to 192.32), and very poor (≤ 164.47). A separate homogeneity test was not required because the paired test analyzes within-student differences rather than independent groups. The normality assumption should apply to the distribution of difference scores.

Ethical Considerations

The source manuscript did not identify an ethics committee, approval number, school authorization, parental consent, child assent, data-protection procedure, or safety protocol. These details must be verified and inserted before submission because all participants were minors.

Results

All 25 students were represented in the pretest–posttest analysis. The mean composite motor ability score increased by 6.12 points, from 200.12 at pretest to 206.24 at posttest. This corresponded to a 3.06% relative increase. The posttest standard deviation was 27.85, with scores ranging from 141.16 to 244.97. The source record did not provide the pretest standard deviation or the standard deviation and confidence interval of the paired differences.

Table 1. Change in composite motor ability scores (n = 25)

Pretest mean	Posttest mean	Mean gain	Change	t(24)	p
200.12	206.24	6.12	3.06%	4.014	<.001

Note. The standardized paired effect derived from the reported *t* statistic was $d_r = 0.80$. A confidence interval for the mean change could not be reconstructed because the standard deviation of the paired differences was not provided.

The paired-samples test indicated a statistically significant increase, $t(24) = 4.014$, $p < .001$. The derived standardized paired effect ($d_r = 0.80$) indicates that the within-student change was moderately large relative to the variability of change scores. Statistical significance and effect magnitude do not by themselves establish that rounders caused the improvement because the design lacked a comparison group.

Table 2. Distribution of posttest motor ability categories (n = 25)

No.	Score interval	Category	Frequency	Percentage
1	>248.02	Excellent	0	0%
2	>220.17–248.02	Good	10	40%
3	>192.32–220.17	Fair	9	36%
4	>164.47–192.32	Poor	2	8%
5	≤164.47	Very poor	4	16%
	—	Total	25	100%

At posttest, 19 students (76%) were classified as fair or good, whereas six students (24%) remained in the poor or very poor categories. No student reached the excellent category. Because the source manuscript did not provide the pretest category distribution or item-level changes, migration between categories and the contribution of each motor component could not be determined.

Discussion

The principal finding was a statistically significant 3.06% increase in composite motor ability after 12 rounders sessions. The derived within-participant effect was moderately large, and 76% of students were classified as fair or good at posttest. These results suggest that repeated participation in a structured striking-and-fielding game may be a useful way to expose upper-grade elementary students to locomotor, power, flexibility, and object-control tasks within one coherent activity.

The result is consistent with the most directly comparable study. Karisman et al. (2020) reported significant improvement in elementary students' fundamental movement skills after 16 sessions of striking-and-fielding games, including rounders. Both programs required children to run, strike, throw, catch, and respond to changing play situations. This task combination is a plausible mechanism: repeated base running challenges acceleration; batting and throwing require coordinated force production; fielding requires visual tracking, spatial adjustment, and catching; and the game format encourages repeated participation.

Broader evidence also supports game-based motor learning. Sun and Chen (2024) found a significant pooled advantage for sports-game interventions across randomized studies with children aged 3–12 years. Yin et al. (2025) concluded that school-based programs improve fundamental movement skills, with stronger effects generally associated with sufficient session duration, frequency, and intervention period. The present program used one-hour sessions and 12 exposures, which provided a potentially meaningful dose, although the missing frequency and calendar duration prevent a precise comparison.

The findings also align with work in Indonesian elementary physical education. Fizi et al. (2023) found a game-based model effective for improving motor skills, cooperation, and discipline among upper-grade students aged 10–12 years. Widodo et al. (2023) developed a small-ball catch-game model intended to integrate motor and cognitive learning in Grade IV. Together, these studies indicate that small-ball games can function as more than recreation: when tasks are purposeful and progressively organized, they can provide repeated object-control and locomotor practice while also requiring communication and decision-making.

Ball-game research offers further support. Jafari et al. (2024) reported improved motor proficiency and visual–motor skills after eight weeks of Heidelberg Ballschule games among girls aged 7–9 years. Although the participants and

program differ from the current study, both approaches use varied ball tasks and perception–action coupling. This is relevant to rounders because successful batting, throwing, and catching depend not only on strength or speed but also on timing, visual tracking, and body positioning.

Nevertheless, the 3.06% mean increase was modest in absolute terms, and six students remained in poor or very poor categories. Motor learning is individual, and a whole-game format may provide unequal practice opportunities: stronger players may bat, throw, or handle the ball more often, while less confident children participate peripherally. Evidence on active play is generally positive but inconsistent, particularly across different motor domains (Zhang et al., 2025). Object-control skills often require deliberate instruction and sufficient successful repetitions. Teachers should therefore supplement games with short stations for throwing accuracy, catching progression, striking from stationary and moving feeds, sprint mechanics, jumping, and mobility.

The composite test included speed, power, flexibility, and throw–catch coordination. Improvement could have occurred in one or several items, but item-level results were unavailable. This limits interpretation because transfer from rounders should be more direct for sprinting and throw–catch coordination than for sit-and-reach flexibility. Future reporting should present each item’s pretest and posttest mean, standard deviation, change, and reliability. Such reporting would show whether the intervention improved a broad motor profile or only selected capacities.

Practical Implications

Rounders can be retained as a curriculum vehicle for motor development, but implementation should maximize equitable engagement. Small teams, multiple batting stations, modified equipment, shorter bases, rotational roles, and rules requiring every student to handle the ball can increase practice density. Teachers should progress task difficulty and provide concise feedback on movement quality. Students remaining below the fair category should receive targeted practice and reassessment. Attendance, fidelity, safety incidents, and individual exposure should be recorded so that improvement can be linked more convincingly to the planned program.

Limitations

The study’s main limitation is the one-group design. Without a control group, maturation, repeated testing, regular physical education, extracurricular activity, and measurement familiarity cannot be ruled out. The sample was small, male-only, and drawn from one school. Exact ages, baseline characteristics, session schedule, intervention content, attendance, fidelity, and safety data were not reported. The source record also omitted the pretest standard deviation, paired-difference variability, confidence interval, item-level results, instrument reliability, and full scoring norms. These limitations require cautious interpretation. A future randomized or matched-control study should use transparent allocation, assessor training, preregistered outcomes, and item-level analysis.

Conclusions

Motor ability scores increased significantly after 25 male students completed 12 one-hour rounders sessions, from a pretest mean of 200.12 to a posttest mean of 206.24, $t(24) = 4.014$, $p < .001$. The 6.12-point gain represented a 3.06% increase and a derived paired effect of $d_r = 0.80$. At posttest, 76% of students were in the fair or good categories. Rounders appears promising as an integrated, enjoyable context for motor practice; however, causal claims are limited by the absence of a control group. Future implementation should document the intervention fully, ensure equitable task exposure, report item-level outcomes, and use a controlled design.

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Author Contributions

Asna Nauli Harahap: conceptualization, methodology, investigation, project administration, and writing—original draft. Eka Abdurrahman: data curation, formal analysis, interpretation, and writing—review and editing. Ramadan: supervision, validation, and writing—review and editing. All authors approved the final manuscript and accept responsibility for the integrity of the work.

Conflict of Interest

The authors declare no conflict of interest.

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Data Availability

The aggregate data supporting the findings are presented in this article. De-identified participant-level data may be made available by the corresponding author upon reasonable request, subject to verification of the original records and applicable ethical requirements.

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