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CHANGES IN 30-M SPRINT PERFORMANCE AFTER TABATA-BASED FAST RUNNING IN PLACE

*Muhammad Subqi Assegaf[1-ABCDE], Muhammad Husni Tamim[1-ABC], Mahfuz[1-CD], Hary Septianwari[1-CD]
[1]Physical Education Study Program, Faculty of Teacher Training and Education, Universitas PGRI Palembang, Indonesia.

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Abstract
This study quantified changes in 30-m sprint time after a Tabata-based fast-running-in-place program among fifth-grade pupils. Materials and Methods: A one-group pretest–posttest design included 25 pupils (13 boys and 12 girls) at SDN 1 Dasan Borok. Participants completed 16 sessions between April and June 2026. The intervention used repeated 20-s maximal running-in-place bouts separated by 10-s rest. Hand-timed 30-m sprint performance was compared using a paired-samples t test. Results: Mean sprint time decreased from 8.39±0.67 to 7.79±0.66 s, an improvement of 0.60 s or 7.17%. Using the reported SPSS statistic, the change was significant, $t(24)=15.514$, $p<.001$, with an estimated 95% CI of 0.52–0.68 s and $d_n=3.10$. Conclusions: Sprint time improved during the program. The result is preliminary because there was no control group, timing was manual, training load was not objectively verified, and conflicting t statistics in the source report require checking against the original output.

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Authors' contribution:
A - Conception and design of the study; B - Acquisition of data; C - Analysis and interpretation of data; D - Manuscript preparation; E - Obtaining funding

Correspondence:
Muhammad Subqi Assegaf
Email: subqi.220104013@student.hamzanwadi.ac.id

INTRODUCTION

Short sprint performance contributes to children's movement competence and participation in athletics and team games. Acceleration over 30 m depends on force production, step frequency and length, coordination, technique, and biological maturity. School physical education can provide structured exposure, but limited lesson time and space often constrain sprint practice.

High-intensity interval training (HIIT) alternates brief vigorous work with recovery and can be time efficient. School-based reviews report favorable effects on several fitness outcomes, including sprint performance, although responses vary by protocol and population (Eddolls et al., 2017; Bauer et al., 2022; Cao et al., 2023).

Tabata's original protocol comprised eight 20-s bouts separated by 10-s recovery, but applying that format to children requires age-appropriate supervision and should not imply that pupils achieve the supramaximal intensity used in the original adult experiment (Tabata et al., 1996).

Fast running in place reproduces rapid alternating leg action in a small area, making it feasible where a sprint track is unavailable. It may develop rhythm, knee drive, and rapid foot contacts, but transfer to forward sprinting is not guaranteed because horizontal propulsion is limited. Evidence from youth sport shows that some HIIT programs improve acceleration and repeated-sprint outcomes, whereas other studies report similar changes across HIIT, continuous training, and controls (Baquet et al., 2019; Michailidis et al., 2023).

At SDN 1 Dasan Borok, teachers observed slow sprint times and technical limitations in fifth-grade pupils. This study therefore quantified changes in hand-timed 30-m performance after 16 Tabata-based fast-running-in-place sessions. We expected posttest time to be lower, while treating the uncontrolled pre–post comparison as preliminary.

METHOD

Design and Participants

A one-group pretest–posttest study was conducted at SDN 1 Dasan Borok, Suralaga, East Lombok, from 29 April to 20 June 2026. All 25 fifth-grade pupils participated (13 boys, 12 girls). The source manuscript does not report age, maturity status, health screening, physical-activity background, eligibility criteria, attendance, parental consent, child assent, or ethics approval. These details should be added before submission.

Intervention

The program comprised 16 sessions. Each lesson included a 10-min warm-up, fast running in place, and a 10-min cool-down. One Tabata block contained eight 20-s maximal bouts separated by 10-s passive recovery (4 min). The manuscript describes progression from two to five blocks with two minutes between blocks and session RPE targets of 5–9. This could produce 8–20 min of interval work, but the weekly progression, frequency, technique criteria, actual RPE, heart rate, adherence, and adverse events were not reported. The term 'set' was ambiguous and is presented here as a block.

Sprint Test

Sprint performance was measured over 30 m on the school field using a stopwatch and flag start. The source cites the Indonesian Physical Fitness Test for children aged 10–12 years. It does not report the number of trials, recovery, start command, surface, footwear, weather, tester number, stopwatch resolution, or test–retest reliability. Manual timing is susceptible to tester reaction error, especially when the observed change is less than one second.

Statistical Analysis

Means, standard deviations, ranges by category, and sex-specific summaries were reported. A paired-samples t test evaluated change at alpha=.05. The manuscript's Kolmogorov–Smirnov tests assessed each occasion separately and its Levene test compared variances; neither is the appropriate paired-test assumption check, which concerns the distribution of within-pupil differences. Percentage improvement was calculated as (pretest−posttest)/pretest×100. The 95% CI and $d_n=t/\sqrt{n}$ were estimated from the reported SPSS t statistic (Lakens, 2013). Raw data were unavailable.

RESULTS

Overall mean sprint time decreased from 8.39 to 7.79 s (Table 1), corresponding to 0.60 s and 7.17%. Boys improved by approximately 0.59 s (7.4%) and girls by 0.61 s (6.9%). These sex-specific values are descriptive because no interaction or adjusted comparison was reported.

Table 1.
Thirty-metre sprint time by sex

Group	n	Pretest, mean±SD (s)	Posttest, mean±SD (s)	Change (s)
Boys	13	7.94±0.38	7.35±0.37	0.59
Girls	12	8.88±0.60	8.27±0.59	0.61
Overall	25	8.39±0.67	7.79±0.66	0.60

Performance categories shifted toward the middle and good categories. No pupil was categorized as good at baseline, compared with five after the program; the number categorized as poor or very poor decreased from 18 to two (Table 2). Category thresholds differed by sex.

Table 2.
Distribution of sprint-performance categories

Category	Pretest, n (%)	Posttest, n (%)
Very good	0 (0)	0 (0)
Good	0 (0)	5 (20)
Moderate	7 (28)	18 (72)
Poor	16 (64)	2 (8)
Very poor	2 (8)	0 (0)

The source report gives three incompatible t values: 20.89 in the abstract and conclusion, 20.38 in the manual calculation, and 15.514 for the SPSS paired test. Table 3 provisionally uses the SPSS value because it is explicitly linked to software output.

On this basis, the estimated mean reduction was 0.60 s (95% CI 0.52–0.68), t(24)=15.514, p<.001, d_n=3.10. These estimates must be replaced if the original paired-samples output differs.

Table 3.
Provisional paired comparison based on the reported SPSS statistic

Contrast	Mean reduction	95% CI	t (df)	p	d_n
Pretest–posttest	0.60 s	0.52–0.68	15.514 (24)	<.001	3.10

DISCUSSION

Pupils completed the 30-m sprint 0.60 s faster on average after the 16-session program. The 7.17% improvement and category shift suggest a practically visible change. Both boys and girls showed similar absolute reductions, although the study was not designed to compare sex-specific responses.

The direction of change is compatible with broader school-based evidence. A network meta-analysis found that HIIT improved 20-m sprint performance relative to comparators (Cao et al., 2023), and a systematic review reported benefits for neuromuscular and anaerobic outcomes when HIIT was delivered in school settings (Bauer et al., 2022). Michailidis et al. (2023) found improved 10-m acceleration after a four-week program in youth football. These findings support the plausibility of improvement but do not validate running in place as the causal mechanism in this class.

Task transfer should be interpreted carefully. Rapid running in place may reinforce step rhythm, coordination, and active leg recovery, while repeated high-intensity work may improve tolerance of vigorous exercise. Nevertheless, sprint acceleration requires horizontal impulse, start mechanics, and progressive forward velocity that stationary action does not reproduce. The program's warm-up, repeated practice, ordinary physical education, motivation, and increasing familiarity with the test could all contribute.

The very large d_n of 3.10 is unusual for a field-based school intervention and depends on the unverified SPSS statistic. The contradictory t values are a material reporting problem. Manual stopwatch error also matters because the mean change was only 0.60 s. Participant-level differences, the original SPSS output, and timing sheets should be audited before reviewers see the manuscript.

Safety and dosage deserve attention in prepubertal pupils. The source describes up to five Tabata blocks and RPE 5–9, but no heart-rate monitoring, adherence, or adverse-event reporting. HIIT can be feasible for youth, yet the literature emphasizes protocol variation and incomplete evidence for some outcomes (Eddolls et al., 2017; Li et al., 2023; Thivel et al., 2025). Teachers should prioritize

technique, individual readiness, adequate recovery, hydration, and symptom monitoring rather than pursuing adult supramaximal targets.

Future research should use an active control group, concealed electronic timing, standardized trial procedures, verified session load, and retention testing. Larger samples should account for sex, age, maturity, baseline activity, and clustering within classes. Comparing running in place with sprint drills or age-appropriate games would clarify whether the space-saving exercise offers specific advantages.

CONCLUSION

Mean 30-m sprint time decreased from 8.39 to 7.79 s during a 16-session Tabata-based fast-running-in-place program. Using the reported SPSS result, the provisional paired estimate was 0.60 s (95% CI 0.52–0.68), $t(24)=15.514$, $p<.001$, $d_n=3.10$. The approach appears feasible and space efficient, but causal effectiveness cannot be established without a control group. Conflicting t statistics and manual timing require verification before submission.

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