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The effect of variations in passing drill form on soccer passing ability at the arafah youth soccer academy

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ABSTRACT

Passing accuracy is a core technical skill in youth soccer, yet the magnitude of improvement following structured passing-drill programs depends on training content, dose, measurement, and contextual factors. This study examined pre-post changes in passing performance after a four-week structured passing-drill program among 15 male U-14 to U-16 players at a soccer school in Payakumbuh, Indonesia. A single-group pretest-posttest pre-experimental design was used. Passing performance was assessed with the Johnson Soccer Test before and after 16 training sessions conducted four times per week. Reported mean performance increased from 14.3 (SD = 1.988) to 17.3 (SD = 2.225), a mean change of 3.0 points (20.98%). The reported paired-samples t-test was $t(14) = 17.75$, $p < .001$. Using the reported t statistic and $n = 15$, the derived standardized paired effect is Cohen's $d_z = 4.58$; this value should be verified against the raw paired scores before final submission. The findings indicate substantial pre-post improvement, but the absence of a control group, small single-club sample, repeated testing, maturation, and other uncontrolled factors prevent a causal conclusion. The results therefore provide preliminary evidence supporting further controlled evaluation of structured passing-drill programs in adolescent soccer.



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Introduction

Passing accuracy contributes to ball retention, progression, and the creation of attacking opportunities in soccer. For adolescent players, technical development is strongly influenced by the amount and quality of practice, task specificity, feedback, and the representativeness of the training environment (Helsen et al., 1998; Williams et al., 2020). Recent research has examined direct passing practice, target-based drills, small-sided games (SSG), combined technical programs, and augmented feedback, but these approaches differ in task constraints, outcome measures, training dose, and participant characteristics (Arslan et al., 2020; Carlsson et al., 2025; Hicheur et al., 2020; Wang et al., 2024).

Evidence from direct passing interventions is encouraging but heterogeneous. Zago et al. (2016) reported improved soccer-specific skill performance after a combined technique-and-agility program in youth players, and ladder-drill training has improved agility in U-17 players (Hadi et al., 2016). Tarju and Wahidi (2017) compared practice distributions for passing development, while Alficandra et al. (2022) examined moving and fixed targets and eye-foot coordination in U-16 soccer (see also Safarrudin et al., 2022). More recent studies have evaluated paired passing drills, square drills, target-based training, rondo-based exercises, first-touch training, and direct passing-skill training, including work with adolescent or youth players (Afrizal & Permono, 2025;

Anwar & Susianti, 2022; Carlsson et al., 2025; Irawan et al., 2019; Kipuw & Ismail, 2025; Pasaribu & Heri, 2025; Permono & Ramadhani, 2025; Rifan et al., 2023; Syahputra et al., 2025). Fundamental movement skill competence is also associated with technical and tactical soccer skill during youth development (Duncan et al., 2022; Kokstejn et al., 2019).

At the same time, contextualized methods such as SSG can improve technical execution and expose players to decision-making demands. Experimental and synthesis studies indicate that technical outcomes are sensitive to player number, pitch dimensions, bout duration, and task constraints (Clemente, Afonso, et al., 2021; Coutinho et al., 2020; Farhani et al., 2022, 2025; Joo et al., 2016; Katis & Kellis, 2009; Oh & Joo, 2018; Riboli et al., 2023; Sarmiento et al., 2018). Meta-analytic evidence also suggests that SSG interventions can produce small improvements in technical execution relative to control conditions, although the literature remains methodologically heterogeneous (Clemente, Ramirez-Campillo, et al., 2021).

A focused synthesis of recent empirical studies therefore points to a practical gap rather than a lack of evidence: studies frequently compare different training modes or manipulate task constraints (e.g., Deri et al., 2018; Yulianto et al., 2025; Zalprayoga et al., 2024), but comparatively little evidence describes a short, structured passing-drill dose delivered consistently to adolescent players and assessed with the same standardized field test before and after training. The present study addresses this applied gap by examining a four-week, 16-session passing-drill program in a youth soccer-school setting. The study objective is to quantify the pre-post change in passing-test performance and to report the magnitude of that change together with methodological constraints that affect causal interpretation.

Because the study uses a single-group design, the hypothesis is deliberately framed as a pre-post hypothesis: passing-test performance will be higher after the intervention than before it. This hypothesis does not assume that the observed change is caused solely by the intervention.

Table 1. Focused synthesis of recent empirical evidence relevant to youth soccer passing and technical-skill development

Study	Participants/design	Training or exposure	Main finding	Relevance to present study
Zago et al. (2016)	20 youth players; longitudinal intervention	Combined technique + agility	Improved soccer-specific skill performance	Supports structured technical practice, but longer dose.
Tarju & Wahidi (2017)	40 beginner players; experimental comparison	Massed vs. distributed practice	Practice organization affected passing development	Shows training-dose/organization matters.
Joo et al. (2016)	Young soccer players; SSG study	Different SSG conditions	Technical and physical activity varied with task format	Highlights contextual effects absent from isolated drills.
Arslan et al. (2020)	U-14/U-15; 5-week intervention	HIIT vs. SSG	Both improved performance; SSG produced stronger technical changes	Supports comparing drill-specific and game-based approaches.
Alficandra et al. (2022)	U-16 soccer players	Moving/fixed targets + eye-foot coordination	Training condition influenced passing accuracy	Directly relevant to targeted passing practice.
Hicheur et al. (2020)	U-14/U-15 elite players; controlled training	Augmented feedback	Feedback group improved passing accuracy and global passing performance	Shows feedback can modify technical learning.
Carlsson et al. (2025)	17 youth female players; 9 sessions	Passing-skill training vs. SSG	Direct passing training improved accuracy across tests	Recent direct evidence for passing-specific practice.
Afrizal & Permono (2025)	12 U-15 players; one-group pre-post	Square passing drill	Passing accuracy improved after intervention	Closest design analogue, but small and single-group.
Kipuw & Ismail (2025)	30 soccer players; one-group pre-post	Target-based passing	Passing accuracy improved after intervention	Supports target-directed practice while highlighting need for controls.
Pasaribu & Heri (2025)	Youth soccer players; intervention	Paired passing drills	Improved passing accuracy	Adds recent drill-specific evidence.

Method

Research design

The submitted manuscript describes the study as quasi-experimental in the Methods section but as pre-experimental in the Discussion. Because there is only one group and no control group, the more accurate classification is a single-group pretest-posttest pre-experimental design (Sugiyono, 2020; Sukmadinata, 2010). The revision uses this terminology consistently and avoids implying that the design can isolate the causal effect of the training program.

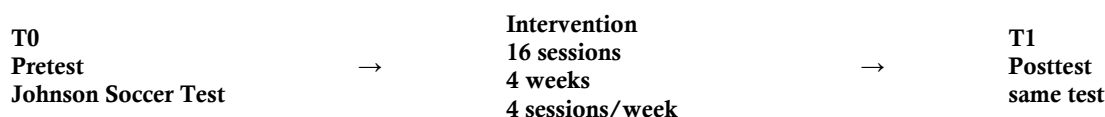


Figure 1. Single-group pretest-posttest design

Participants and sampling

The study involved 15 male soccer players in the U-14 to U-16 age range who participated in regular training at the Arafah soccer school in Payakumbuh. Purposive sampling was used with male youth status as the stated selection characteristic. The sample was therefore a convenience-type, single-club sample and should not be interpreted as statistically representative of adolescent soccer players in general.

No a priori sample-size or power calculation was documented in the supplied manuscript. For transparency, a post hoc sensitivity calculation indicates that $n = 15$, with a two-sided alpha of .05 and 80% power, is sufficient to detect only a relatively large paired standardized effect (approximately $d_z = 0.78$). This sensitivity estimate does not justify the original sample size; it instead shows why replication with a larger, prospectively powered sample is needed.

Instrument

Passing performance was measured with the Johnson Soccer Test. The test is a standardized short-duration passing test in which the player repeatedly passes a ball against a target/board during a 39-second period and the number of valid kicks is scored. Published applications report normative bands of $>42 =$ very good, $37-41 =$ good, $31-36 =$ moderate, $25-30 =$ poor, and $<24 =$ very poor. However, the supplied manuscript did not document a population-specific validity or reliability coefficient for the Johnson Soccer Test. To avoid fabricating psychometric evidence, this revision reports the documented procedure and normative bands and explicitly identifies local psychometric evidence as a limitation. Where stronger measurement-property evidence is required, the Loughborough Soccer Passing Test (LSPT) has a published systematic review documenting moderate-to-excellent test-retest reliability and discriminative validity, while also warning about the interpretation of individual change (Wen et al., 2018).

The Johnson Soccer Test procedure and normative ranges should be cross-checked with the exact administration manual or source used by the research team before final submission (Mae, 2024).

Intervention and procedure

The intervention lasted four weeks and comprised 16 training sessions delivered at a frequency of four sessions per week. A passing- drill program was implemented between the pretest and posttest. The supplied manuscript does not contain a session-by-session drill log specifying repetitions, work-to-rest ratios, distances, targets, or coach feedback, so those details are intentionally not invented in this revision. For full replication, the authors should append the actual training log used during the 16 sessions, including drill name, duration/repetition, number of sets, rest interval, passing distance, target arrangement, progression rule, and feedback procedure.

Statistical analysis

Descriptive statistics were calculated for pretest and posttest scores. The supplied manuscript reports Shapiro-Wilk significance values of .126 for the pretest and .196 for the posttest. Because the observations are paired within participants, the primary inferential analysis is a paired-samples t-test rather than an independent-samples test. A homogeneity-of-variance test is not an assumption of the paired t-test and has therefore been removed from the decision rule. Cohen's d_z was calculated from the reported paired-t statistic as $t/\sqrt{n}$. Because the original raw paired scores were not supplied, the reported t value and derived effect size must be verified against the original dataset before submission. All tests use $\alpha = .05$.

Results and Discussions

Descriptive statistics

The supplied results report pretest scores ranging from 11 to 17 and posttest scores ranging from 15 to 21. The pretest mean is reported as 14.3 with SD = 1.988, while the posttest mean is 17.3 with SD = 2.225. These values indicate a mean increase of 3.0 points, equivalent to 20.98% relative to the reported pretest mean.

Table 2. Descriptive statistics for passing-test performance

Measure	n	Minimum	Maximum	Mean	SD
Pretest	15	11	17	14.3	1.988
Posttest	15	15	21	17.3	2.225
Change	15	-	-	+3.0	-

Table 3. Corrected normative classification using the published Johnson Soccer Test bands

Test	Observed range	Norm band containing all observed scores	n	%
Pretest	11-17	Very poor (<24)	15	100
Posttest	15-21	Very poor (<24)	15	100

The original Table 3 contained category intervals such as 37-41, 31-26, and 25-30 while the reported observed scores were only 11-17 at pretest and 15-21 at posttest. Those values cannot support the original frequency percentages. After correction, all observed scores fall within the published <24 band. Because participant-level raw scores were not supplied, the revised table does not manufacture more detailed frequency counts than can be verified from the reported ranges.

Inferential result and effect magnitude

The principal result is a substantial pre-post increase in passing-test performance after the four-week training period. However, the result should be interpreted as an observed change within one group rather than definitive evidence of a causal treatment effect. The distinction is important because repeated testing, maturation, normal training exposure, motivation, and regression to the mean can all contribute to pre-post changes when there is no concurrent control group.

Table 4. Pretest-posttest comparison

Comparison	n	Mean change	t	df	p
Posttest - Pretest	15	3.0	17.75	14	<.001

The magnitude and direction of change are broadly consistent with recent passing-specific interventions. Carlsson et al. (2025) found that passing-skill training improved side-foot kick accuracy in youth female players across repeated tests, whereas a small-sided-game condition did not show the same pattern across all measures. Afrizal and Permono (2025), Kipuw and Ismail (2025), and Pasaribu and Heri (2025) also reported improvements after passing-specific or target-oriented drills, although these studies differ in sample size, test procedures, and design. Alficandra et al. (2022) likewise reported an influence of target type and eye-foot coordination on passing accuracy. These converging findings support the practical value of specific passing practice, but they do not establish that every drill format will produce the same effect.

Comparisons with game-based methods add an important contextual qualification. Arslan et al. (2020) reported technical benefits from small-sided-game training in U-14/U-15 players, while Joo et al. (2016), Oh and Joo (2018), Farhani et al. (2022) and Rumpf et al. (2025), Coutinho et al. (2020), and Riboli et al. (2023) demonstrated that pitch dimensions, player numbers, bout duration, and other task constraints can alter technical actions and decision demands. A meta-analysis by Clemente, Ramirez-Campillo, et al. (2021) found a small positive effect of SSG interventions on technical execution relative to controls. Taken together, the literature suggests that isolated passing drills and contextualized SSGs should be viewed as complementary rather than mutually exclusive training options: drills can emphasize repetition and target accuracy, whereas SSGs can add perception-action coupling, pressure, and decision-making.

Training organization and dose also matter. Tarju and Wahidi (2017) showed that practice distribution can affect passing development, and Zago et al. (2016) reported skill improvements after a considerably longer combined program. Recent direct passing studies have used shorter protocols, including nine sessions in Carlsson et al. (2025), while the present program used 16 sessions across four weeks. Because different studies use different tests and outcomes, the present 3-point increase should not be interpreted as evidence that 16 sessions is an optimal universal dose.

Feedback provides another plausible mechanism. Hicheur et al. (2020) demonstrated that augmented feedback improved passing-related performance in U-14/U-15 players, and reviews and experimental studies

indicate that external-focus instructions and augmented feedback can enhance motor learning under appropriate conditions (Chua et al., 2021; Lauber & Keller, 2014; Lewthwaite & Wulf, 2017; Perreault & French, 2015; Rahyubi, 2012; van den Tillaar & Ulvik, 2014; van der Veer et al., 2022; Wulf et al., 2002). The supplied manuscript does not document the exact feedback strategy used during the 16 sessions, so feedback cannot be isolated as a mediator of the present change.

Measurement considerations are also relevant. The original manuscript uses the Johnson Soccer Test, but does not provide population-specific validity or reliability coefficients. Consequently, a large standardized pre-post effect should not be interpreted without considering measurement stability and possible familiarization with the test. Wen et al. (2018) showed that even the better-documented LSPT has limitations for interpreting intra-individual change, despite acceptable test-retest reliability and discriminative validity. Future work should therefore combine a validated passing test with a second ecologically relevant outcome, such as successful passes in small-sided or match-play contexts.

Several threats to internal validity must be acknowledged explicitly. First, maturation is unavoidable in adolescents and may contribute to skill development over four weeks. Second, testing effects may arise because the participants completed the same passing test twice. Third, history effects are possible because the players continued their normal club training outside the intervention. Fourth, regression to the mean may inflate improvement when baseline scores are relatively low. Fifth, there was no assessor blinding, and the manuscript does not document whether test administration was standardized with the same tester, ball condition, surface condition, and warm-up. These threats mean that the t-test establishes a statistical difference between two time points, not an uncontested treatment effect.

External validity is likewise bounded. The sample comprised only 15 male U-14 to U-16 players from one soccer school in Payakumbuh, and the age range combines two developmental stages. Findings therefore should not be generalized automatically to female players, elite academy populations, younger children, adult players, or clubs with substantially different coaching, facilities, or competitive environments. The most defensible interpretation is that the observed pre-post improvement is relevant to this type of youth soccer-school context and should be tested in larger multi-site samples before wider application.

Finally, the present study's strongest value is pragmatic: it provides a clearly bounded pilot estimate that can inform a future controlled trial. A next study should recruit a prospectively powered sample, use random assignment where feasible, include a no-treatment or alternative-training control group, record the intervention session by session, standardize test administration, and include a retention or transfer measure. Such a design would distinguish genuine learning from temporary test familiarity and would permit stronger inference about which drill characteristics, training dose, and feedback conditions produce the most durable improvements.

Practical implications

Coaches may use structured passing drills as one component of youth technical training, especially when the immediate goal is repeated execution and target accuracy. However, the present evidence does not justify replacing game-based practice or claiming that passing drills are universally superior. A balanced program can combine specific passing repetition with progressively more representative small-sided tasks and clear feedback, while monitoring whether gains transfer to decision-making and successful passing during play.

The study has several methodological and reporting limitations that should be addressed before resubmission. First, it uses a single-group pretest-posttest design without a control group, which limits the ability to attribute observed changes solely to the training intervention. Second, the sample consists of only 15 male players from one club and two adjacent age categories, and no a priori sample-size calculation was documented; consequently, the sample size has limited sensitivity to moderate effects. Third, the supplied manuscript does not report population-specific validity or reliability coefficients for the Johnson Soccer Test. In addition, the training log does not provide sufficient session-level detail to reproduce the exact drill progression, training volume, or feedback conditions. There is also an inconsistency in the reported pretest mean, which appears as 14.3 in most sections but as 14.4 in one hypothesis-test table; this discrepancy should be checked against the raw dataset. Similarly, the reported t-value of 17.75 and the derived Cohen's d_z of 4.58 should be verified using the raw paired scores. Finally, the supplied manuscript does not document ethics approval or parental consent information; therefore, the authors should insert the verified ethics approval and parental consent details before resubmission.

Conclusions

Passing-test performance increased from a reported mean of 14.3 at pretest to 17.3 at posttest after a four-week, 16-session structured passing-drill program in 15 male U-14 to U-16 soccer players. The reported paired

comparison was $t(14) = 17.75$, $p < .001$, with a derived Cohen's d_z of 4.58 based on the reported t statistic. Nevertheless, because the study used a single-group pre-experimental design, the result demonstrates pre-post improvement rather than a definitive causal effect of the intervention. Interpretation is further constrained by the small single-club sample, possible maturation and practice effects, continued background training, and incomplete documentation of psychometric and session-level intervention details. Future controlled, prospectively powered studies are required to determine the independent contribution and transferability of structured passing-drill programs.

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