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Improving Basic Underhand Passing Technique through Paired Training among Volleyball Players of the Spenra Lumajang Club

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ABSTRACT

This study aimed to examine the effectiveness of paired underhand passing training in improving basic underhand passing skills among volleyball players of the Spenra Lumajang Club. The research employed a quantitative approach using a quasi-experimental method with a pre-test and post-test control group design. A total of 20 athletes participated in the study and were randomly assigned into two groups: an experimental group (n = 10) and a control group (n = 10). The experimental group received a paired underhand passing training program for 16 sessions over six weeks, while the control group continued with the club's regular training program without additional technical intervention. Data were collected using the Brumbach Forearms Pass–Wall Volley Test to assess players' underhand passing ability before and after the training intervention. Statistical analyses included tests of normality and homogeneity to ensure data suitability, followed by an Independent Sample t-test and gain score analysis at a significance level of 0.05. The results showed that both groups experienced improvements in underhand passing performance; however, the experimental group demonstrated a significantly greater increase compared to the control group. These findings indicate that paired underhand passing training had a positive and statistically significant effect on enhancing the mastery of basic underhand passing techniques. The improvement observed in the experimental group suggests that paired training provides more effective movement repetition, immediate feedback, and better coordination between players, which are essential components in motor skill learning. In contrast, routine training without specific technical focus resulted in relatively limited performance gains. Therefore, paired underhand passing training can be considered an effective and practical training approach for improving basic volleyball skills, particularly in school-level athlete development programs. This study provides empirical evidence to support the integration of structured paired technical training into volleyball coaching practices.

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INTRODUCTION

Volleyball is a team sport that is rapidly growing in schools, communities, and youth development programs. In addition to its physical activity, volleyball plays a crucial role in developing discipline, coordination, precision, and teamwork, which are the foundation of game performance (Alwijaya, 2018; Sheppard & Gabbett, 2016). In the context of performance development, volleyball performance is determined by physical readiness, mastery of basic techniques, and synchronized movement between players, which are systematically structured from the early stages of development (FIVB, 2022; Palao & Valadés, 2020).

A volleyball game always begins with the first ball reception, which determines the continuity of attacks and the effectiveness of teamwork. Failure to master basic techniques, particularly underhand passing, often leads to interruptions in the flow of play due to ball control errors (Mulya, 2019; Marcelino et al., 2018). At the school level, limited mastery of basic techniques is a crucial issue because most athletes are still in the motor development phase, resulting in underdeveloped movement stability and technical accuracy (Prayoga et al., 2022; Lloyd et al., 2019).

The underhand pass is a fundamental technique used to receive serves, block attacks, and direct the ball to teammates. This technique requires harmonious coordination between foot position, body posture, arm stability, and visual focus on the ball (Sucifirawati, 2020; Bartlett, 2017). A small error in any of these movement components can significantly impact the quality of direction and control of the ball, thus hindering the continuation of play. Therefore, improving the quality of basic underhand passing training is an urgent need in school-age volleyball development.

This situation also occurs at the Spenra Lumajang Club, a school-level volleyball development club that aims to improve students' playing skills through programmed training. Field observations indicate that athletes' underhand passing abilities are not evenly distributed. Some athletes are capable of passing well, while others frequently make mistakes in body positioning and ball direction. This imbalance in ability impacts the stability of teamwork during training and matches. This situation underscores the need for more targeted, effective, and tailored basic technique training interventions tailored to the characteristics of school-age athletes.

Recent literature confirms that the effectiveness of basic volleyball technique development is greatly influenced by training design that emphasizes the principles of specificity, meaningful repetition, and direct feedback (Bompa & Buzzichelli, 2019; Issurin, 2021). Basic technique training is no longer viewed simply as repetitive movements, but as a motor learning process that must be designed in a contextual, communicative, and quality-oriented manner (Renshaw et al., 2019).

Several studies have shown that structured underhand passing practice can improve technical accuracy and consistency in young athletes (Marcelino et al., 2018; Palao et al., 2021). Social interaction-based training models, such as paired training, are considered effective because they allow athletes to receive direct visual and kinesthetic feedback from their training partners (Pagappong, 2015; Hadari, 2012). This approach

aligns with the constraints-led approach and ecological dynamics theory, which emphasize the importance of individual-environment interactions in sports skill learning (Davids et al., 2015; Araújo et al., 2019).

Recent empirical research also shows that pair training can improve coordination between players, postural stability, and ball contact quality in team sports (García-de-Alcaraz et al., 2020; Silva et al., 2022). In a school-age context, this training is considered effective in reducing training boredom, increasing active athlete engagement, and accelerating the adaptation of basic techniques through meaningful repetition (Lloyd & Oliver, 2020; Myer et al., 2015). Thus, pair underhand passing training holds great potential as a pedagogical and technical approach in school volleyball development.

Although various studies have discussed the importance of fundamental volleyball technique training, most research focuses on high-achieving or competitive athletes, with a general training approach that lacks contextualization for school development (Palao & Valadés, 2020; Marcelino et al., 2018). Research specifically examining the effectiveness of underhand passing training in school-level volleyball clubs remains relatively limited, particularly in the context of quantitatively measuring changes in technical ability through pre-post training designs.

Furthermore, some studies emphasize biomechanics or match performance, while the fundamental motor learning and technical stability dimensions of school-age athletes have not been explored in depth (Lloyd et al., 2019; Silva et al., 2022). There is no strong empirical evidence regarding the extent to which underhand passing training can significantly improve fundamental technique in the context of school clubs with heterogeneous athlete characteristics.

Therefore, there is a clear research gap regarding the need for experimental studies examining the impact of underhand passing training on improving underhand passing ability in school-level volleyball athletes. This research is needed to enrich the knowledge of sports coaching and provide an empirical basis for the development of more effective and applicable training programs.

Based on these research problems and gaps, the purpose of this study is to analyze the effect of paired underhand passing training on improving basic underhand passing skills in volleyball athletes from the Spenra Lumajang Club. This study was conducted by measuring technical abilities before and after implementing a paired underhand training program over a specific period, thus obtaining an objective picture of changes in athlete abilities.

The novelty of this study lies in: (1) its focus on the context of school-level volleyball coaching, (2) its application of a communicative, motor-learning-based paired underhand passing training model, and (3) its presentation of quantitative empirical evidence regarding the training's effectiveness in improving basic technique quality. The results of this study are expected to not only provide theoretical contributions to the development of volleyball coaching science but also serve as a practical reference for school coaches in designing more systematic, effective, and tailored basic technique training programs tailored to the needs of young athletes.

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METHODS

Research Design and Approach

This study used a quantitative approach with a quasi-experimental design, specifically a pretest–posttest control group design. The choice of a quasi-experimental design was based on the researcher's limitations in controlling all external variables that could potentially influence the research subjects, as is common in the context of school-based sports coaching (Creswell & Creswell, 2018; Thomas, Nelson, & Silverman, 2015). This design allowed the researcher to objectively evaluate the effects of the treatment by comparing changes in technical ability before and after the intervention in the experimental and control groups.

Methodologically, a pretest–posttest control group design is considered effective in sports coaching research because it minimizes internal bias and provides a more accurate estimate of the treatment's impact than a single-group design (Sugiyono, 2015; Fraenkel, Wallen, & Hyun, 2019). Through this design, underhand passing ability was measured in two groups with relatively homogeneous characteristics but receiving different training treatments.

Table 1.
Pretest–Posttest Control Group Design

Group	*Pre – test*	Treatment	*Post - test*
Control	O1	T	O2
Experiments	O1		O2

Research Location and Time

The research was conducted on the volleyball court of Ranuyoso State Junior High School, Ranuyoso District, Lumajang Regency, East Java. This location was chosen because it is the regular training ground for the Spenra Lumajang Volleyball Club, ensuring that the research subjects were in a familiar and ecological training environment, which is important for maintaining the external validity of sports research (Davids et al., 2015; Araújo et al., 2019). The study lasted six weeks, from November to December, with training sessions three times per week (Monday, Wednesday, and Friday). There were a total of 18 sessions, consisting of one pre-test session, 16 treatment training sessions, and one post-test session. The duration and frequency of this training were adjusted to the principles of short-term periodization and motor adaptation in school-age athletes (Bompa & Buzzichelli, 2019; Lloyd & Oliver, 2020), and did not interfere with academic activities or other extracurricular programs.

Research Population and Sample

The population in this study was all 20 athletes from the Spenra Lumajang Volleyball Club. All athletes had a relatively homogeneous age range and training background, thus meeting the requirements for an experimental sports research population (Thomas et al., 2015). The sampling technique used purposive sampling, with the following criteria: (1) actively participating in regular club training, (2) being in good physical condition and injury-free, and (3) willing to participate in the entire study. Based on these criteria, all members of the population met the requirements and were included in the study sample

(total sampling). The sample was then divided into two groups using simple random sampling to minimize selection bias (Fraenkel et al., 2019). Ten athletes were designated as the experimental group, and another 10 athletes as the control group. The selection process was conducted using a lottery method using coded paper, so that each athlete had an equal chance of being assigned to one of the groups.

Data Collection Instruments and Techniques

Data collection was conducted through testing and documentation. The primary instrument used was the Brumbach Forearm Pass-Wall Volley Test, which is widely used to measure basic underhand passing skills and has proven to have good validity and reliability in volleyball research (Palao et al., 2021; Marcelino et al., 2018). The test was conducted with participants standing 1 meter from a target wall and then executing underhand passes toward the target for 60 seconds. Scores were obtained from the number of ball bounces that hit the target area according to the test criteria. Measurements were taken twice: before treatment (pre-test) and after the entire training session (post-test). The testing procedure followed the principles of standardized sports skills testing to ensure data consistency and accuracy (Bartlett, 2017; Thomas et al., 2015). In addition to testing, documentation was used to collect supporting data, including athlete identities, training attendance, and notes and visual documentation throughout the research process. This data served as administrative control and verification of treatment implementation.

Training Treatment Procedure

The experimental group received 16 sessions of paired underhand passing training, designed progressively according to the principles of motor learning and training specificity (Issurin, 2021; Renshaw et al., 2019). Each session consisted of three phases: warm-up, core training, and cool-down. The core training consisted of paired underhand passing with gradually adjusted distances, aimed at improving directional control, power of propulsion, and postural stability. This training model allows athletes to receive direct feedback from their training partners, which has been shown to be effective in improving coordination and fundamental technical quality in team sports (García-de-Alcaraz et al., 2020; Silva et al., 2022). Meanwhile, the control group underwent a regular club training program without additional paired underhand passing training. This was done to compare the specific effects of the treatment on improving underhand passing skills.

Data Analysis Techniques

Pre-test and post-test data were analyzed using descriptive and inferential statistics. Prerequisite tests included normality and homogeneity tests to ensure the data met the assumptions of parametric analysis (Field, 2018). Next, differences in improvement in underhand passing ability were analyzed using paired sample t-tests and independent sample t-tests at a significance level of 0.05.

This analytical approach is commonly used in experimental sports research to objectively and reliably evaluate the effectiveness of training interventions (Cohen et al., 2018; Thomas et al., 2015).

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RESULTS AND DISCUSSION

Result

The results of this study were obtained from measurements of the basic technical ability of underhand passing among volleyball players of the Spenra Lumajang Club, conducted through two testing stages, namely the pre-test and the post-test. The measurements were carried out using the Brumbach Forearms Pass-Wall Volley Test, which aims to objectively assess players' underhand passing skill levels. This study involved 20 athletes who were divided into two groups: an experimental group and a control group, each consisting of 10 participants. The experimental group received a treatment in the form of paired underhand passing drill training for 16 sessions, while the control group participated only in the club's regular training program without any specific treatment.

The pre-test was administered prior to the implementation of the training program, whereas the post-test was conducted after the entire training program had been completed. Data obtained from both measurement stages were then analyzed statistically using SPSS software version 25. The data analysis included descriptive statistics, tests of normality, tests of homogeneity, and hypothesis testing using an independent samples t-test. All stages of analysis were carried out to ensure that the research findings are scientifically accountable and in accordance with established statistical principles.

Table 1.
Assessment Sheet Pretest dan Posttest

No	Player Name	M/F	*PreTest Score*	Category	Score *PostTest*	Category	Improvement
1	SBNR	F	4	Very Lacking	5	Very Lacking	Increasing
2	NQ	F	6	Very Lacking	8	Very Lacking	Increasing
3	MF	M	12	Lacking	13	Lacking	Increasing
4	MFA	M	8	Very Lacking	8	Very Lacking	Not Increasing
5	AAS	M	4	Very Lacking	6	Very Lacking	Increasing
6	HAS	M	13	Not Good	12	Lacking	Increasing
7	MH	F	5	Very Lacking	7	Very Lacking	Increasing
8	AHH	F	7	Very Lacking	11	Lacking	Increasing
9	MA	M	7	Very Lacking	6	Very Lacking	Not Increasing
10	PO	F	5	Very Lacking	4	Very Lacking	Not Increasing
11	AB	M	8	Very Lacking	19	Pretty Good	Increasing
12	JRF	M	13	Lacking	25	Good	Increasing
13	SM	M	10	Lacking	22	Good	Increasing
14	RF	M	15	Pretty Good	27	Very Good	Increasing
15	RDR	M	17	Pretty Good	30	Very Good	Increasing
16	JDD	M	16	Pretty Good	28	Very Good	Increasing
17	CIF	M	10	Lacking	21	Good	Increasing
18	AD	M	15	Pretty Good	30	Very Good	Increasing
19	MRP	M	13	Pretty Good	27	Very Good	Increasing
20	MRW	M	17	Pretty Good	30	Very Good	Increasing

The experimental group was the group that received a structured paired underhand passing training program over a six-week period, with a total of 16 sessions. Based on the results of underhand passing ability measurements at the pre-test and post-test stages,

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a substantial improvement in ability was observed after the players participated in the training program. Descriptively, the measurement results for the experimental group indicate that the mean pre-test score was 13.40, while the mean post-test score increased to 25.00. This increase in the mean score illustrates a significant improvement in underhand passing ability following the implementation of the treatment.

The pre-test median score of 14.00 increased to 27.00 in the post-test, indicating that the majority of players experienced a relatively uniform improvement in performance. In terms of data dispersion, the pre-test variance was 10.044 and increased to 16.100 in the post-test, with a pre-test standard deviation of 3.169 and a post-test standard deviation of 4.012. These results indicate the presence of variability in players' performance outcomes, yet still within acceptable limits. The minimum score recorded in the pre-test was 8, which increased to 19 in the post-test, while the maximum score rose from 17 in the pre-test to 30 in the post-test. The score range also changed from 9 in the pre-test to 11 in the post-test.

Table 2.
Description of the experimental group

Statistic	Pretest	Posttest
Mean	13,4	25
Median	14	27
Variance	10,044	16,1
Std. Deviation	3,169	4,012
Minimum Score	8	19
Maksimum Score	17	30
Range	9	11

The control group served as a comparison group that did not receive any specific treatment and only participated in the routine training program regularly conducted by the club. The measurement of underhand passing ability in this group was also carried out through pre-test and post-test using the same instrument, allowing the results to be objectively compared with those of the experimental group. Descriptive analysis of the control group indicated that the mean pre-test score was 7.10, while the mean post-test score increased to 8.00. This increase in the mean score was relatively small compared to that of the experimental group. The pre-test median score of 6.50 increased to 7.50 in the post-test, indicating an improvement, although not substantial. The pre-test variance of 9.878 decreased to 3.055 in the post-test, with a pre-test standard deviation of 3.143 and a post-test standard deviation of 3.055. The minimum and maximum scores in both the pre-test and post-test remained the same, at 4 for the minimum score and 13 for the maximum score, with a score range of 9 in both tests.

Table 3.
Description of control group data

Statistic	Pretest	Posttest
Mean	7,1	8
Median	6,5	7,5
Variance	9,878	3,055
Std. Deviation	3,143	3,055
Minimum Score	4	4
Maksimum Score	13	13
Range	9	9

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Before conducting hypothesis testing, a prerequisite analysis was first performed in the form of a normality test using the Shapiro–Wilk method, as the sample size was fewer than 50. This test aimed to determine whether the pre-test and post-test data from both groups were normally distributed. The results of the normality test indicated that the significance value for the pre-test of the experimental group was 0.292 and for the post-test was 0.169. Meanwhile, the significance value for the pre-test of the control group was 0.069 and for the post-test was 0.418. All significance values were greater than 0.05; therefore, it can be concluded that the data were normally distributed.

Table 4.
Results of the Normality Test for Pre-Test and Post-Test Data of the Experimental and Control Groups

Group	(*Pretest*) (Sig)	(*Posttest*) (Sig)
Group Eksperimen	0.292	0.169
Group Control	0.069	0.418
Note	P > 0,05	P > 0,05
Status	Normal	Normal

After the data were confirmed to be normally distributed, the next step was a homogeneity test using Levene's Test to examine the equality of variances between the experimental group and the control group. The test results showed a significance value of 0.748 for the pre-test and 0.279 for the post-test, both of which were greater than 0.05. These results indicate that the data variances between the groups were homogeneous; therefore, hypothesis testing could be continued using an independent samples t-test.

Table 5.
Test Result Homogenitas Pretest dan Posttest

Type Tes	*Levene Statistic*	df1	df2	Sig. (p)	Note
Pretest Pasing Down	0.107	1	18	0.748	Homogen
Posttest Pasing Down	1.247	1	18	0.279	Homogen

Hypothesis testing in this study employed a *t*-test to determine whether the paired underhand passing drill method used was effective. In addition, the *t*-test was also applied to confirm whether there was an improvement in underhand passing ability after the athletes completed the training program for the predetermined period. The results of the independent samples *t*-test on the post-test data showed a calculated *t* value of –11.224 with a significance value (Sig. 2-tailed) of 0.000, which is lower than the predetermined significance level 0,05.

Table 6.
Test Result T Posttest Group Experiment and Control

Variable	Group	N	Mean	Std. Dev	t-Count	df	Sig. (2-tailed)	Note
Post-test	Experiment	10	25.90	4.012	-11.224	18	0.000	
	Control	10	8.00	3.055	-11.224	-	0.000	**Significant**

These results indicate that there is a significant difference in underhand passing ability between the experimental group and the control group after the treatment was administered. The mean score of the experimental group was substantially higher than that of the control group; therefore, it can be concluded that paired underhand passing training has an effect on improving the basic technical underhand passing ability of volleyball players at the Spenra Lumajang Club.

Discussion

The results of the statistical prerequisite tests showed that the pre-test and post-test data for both the experimental and control groups were normally distributed and had homogeneous variance. This condition indicates that the data characteristics between groups are relatively comparable and meet the assumptions of parametric statistical tests. By meeting the assumptions of normality and homogeneity, the t-test analysis is valid for examining differences in underhand passing ability between groups (Field, 2018; Fraenkel et al., 2019). Methodologically, this strengthens the internal validity of the study and ensures that any differences in results can be logically attributed to the training treatment provided, rather than to statistical bias or differences in the subjects' baseline characteristics.

The main findings of the study indicate a significant difference in improvement in underhand passing ability between the experimental and control groups in the post-test phase. The group that received underhand passing training in pairs showed a significantly greater improvement in scores than the group that only participated in the club's regular training program. These results confirm that underhand passing training in pairs has a positive and meaningful impact on improving mastery of basic underhand passing techniques in Spenra Lumajang Club volleyball athletes. In contrast, the improvement in the control group was relatively limited and disproportionate, indicating that routine training without a specific technical focus is less than optimal in significantly improving the quality of basic skills.

Conceptually, volleyball technique is understood as a player's ability to control the ball effectively and efficiently according to the rules of the game to achieve optimal performance (Sistiasih et al., 2022; Palao & Valadés, 2020). As a fundamental technique, the underhand pass plays a strategic role because it determines the continuity of the game, particularly during the initial serve-receive and defense phases. When this technique is not mastered properly, the flow of the game tends to be disrupted and team coordination becomes unstable (Marcelino et al., 2018; Mulya, 2019). Therefore, improving the quality of underhand passes through an appropriate training approach is a fundamental requirement in school-age volleyball development.

The pair-based underhand passing drills implemented in this study provided athletes with the opportunity to perform structured and continuous movement repetitions within the context of direct interaction with a training partner. This training pattern allowed players to directly direct the ball to their partner, allowing for immediate identification and correction of movement errors. This finding aligns with motor learning

theory, which emphasizes the importance of immediate feedback in accelerating movement adaptation and improving technical stability (Schmidt & Lee, 2019; Renshaw et al., 2019). Through pair-based training, athletes not only repeat movements but also learn to adjust their arm angles, body positions, and ball-pushing force based on their partner's responses.

From an ecological dynamics perspective, pair-based training creates a learning environment more representative of real-life game situations, as athletes must continually adapt to variations in ball direction and speed (Davids et al., 2015; Araújo et al., 2019). This contrasts with individual training, which is static and requires minimal interaction. Interaction between players in paired training encourages the development of interpersonal coordination, a crucial aspect in team sports like volleyball (García-de-Alcaraz et al., 2020; Silva et al., 2022). This explains why the improvement in underhand passing ability in the experimental group was not only quantitative but also reflected in the stability of ball control and the players' confidence when receiving the ball.

The improvement in underhand passing ability in the experimental group was also influenced by the intensity and continuity of the scheduled training. The six-week training program, conducted three times per week, provided sufficient stimulus for motor adaptation without causing excessive fatigue. This principle aligns with the concept of short-term training periodization, which emphasizes a balance between training load and recovery, particularly in school-age athletes (Bompa & Buzzichelli, 2019; Lloyd & Oliver, 2020). Gradual adaptation allows players to progressively improve motor control, resulting in more stable and consistent underhand passing.

The findings of this study also corroborate previous studies, which found that specific and communicative basic technique training is more effective than less focused, general training (Issurin, 2021; Myer et al., 2015). In the control group, although there was an increase in underhand passing ability, the increase was relatively small because the club's routine training did not specifically emphasize repeating underhand passing techniques in a structured pattern. This suggests that mastery of basic techniques is not sufficient through participation in general training but requires training interventions specifically designed to meet the technical needs of the desired improvement.

The low volleyball performance of students at Ranuyoso Public Junior High School is also related to other contributing factors beyond basic technique skills, such as limited training duration, minimal variation in methods, and a lack of systematic training program. This study shows that when basic technique training is structured in a focused manner and delivered consistently, significant improvement in ability can be achieved despite limited facilities and training time. This aligns with the view that the quality of training design has a greater influence than the quantity of training alone (Palao et al., 2021; Bartlett, 2017).

Practically, the results of this study indicate that improved mastery of underhand passing techniques positively impacts the stability of team play. Effective underhand passing allows the ball to be accurately directed to teammates, increasing the

opportunity to continue attacks and score points. When players lack mastery of this technique, the flow of play tends to be disorganized, ultimately reducing overall team performance. Therefore, training in basic underhand passing techniques should be a priority in school volleyball development.

Thus, this discussion confirms that training in underhand passing in pairs is an effective, relevant, and applicable approach to improving basic underhand passing skills in school-level volleyball athletes. The integration of interaction-based training, meaningful repetition, and direct feedback has been shown to significantly improve movement quality. These findings provide an empirical contribution to the development of basic volleyball technique training models and strengthen the theoretical basis for motor learning in the context of school-age team sports.

CONCLUSION

The results of the study indicate an improvement in the basic technical underhand passing ability of volleyball players at the Spenra Lumajang Club after the implementation of a structured training program. This improvement was clearly observed in the group that received paired underhand passing training compared to the group that only participated in routine training. Paired underhand passing training was shown to have a positive effect on players' skill development, as it provides opportunities for active and repetitive practice involving direct interaction among players. Through this form of training, players were able to gradually improve body positioning, regulate the force applied to the ball, and enhance the accuracy of pass direction. In addition, paired training helps players develop movement coordination and readiness to receive the ball from various directions, resulting in more stable ball control during gameplay.

The differences in outcomes between the experimental and control groups indicate that specifically directed technical training yields better results than general training without additional treatment. Systematically designed training programs also play a role in helping players adapt to the movement demands of underhand passing in volleyball. Based on the results of data analysis and observations conducted during the study, paired underhand passing training can be applied as an effective form of training to improve basic technical underhand passing ability in volleyball coaching and training programs.

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